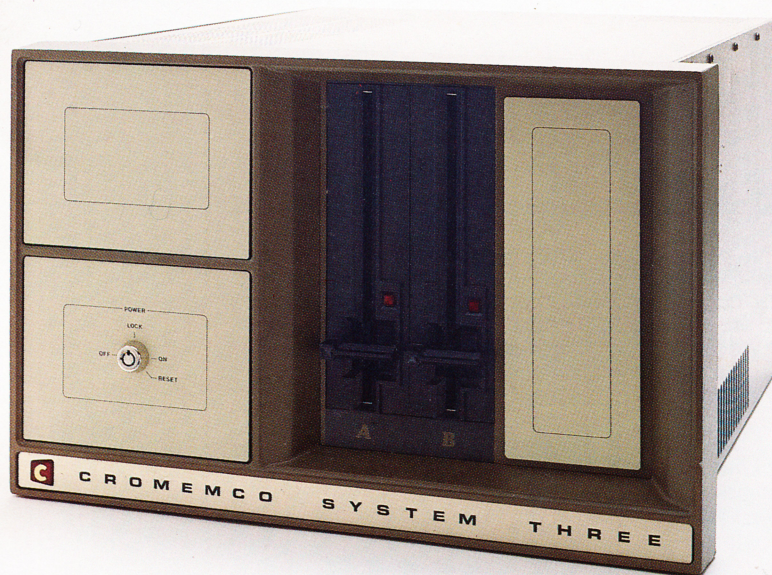


System Three Gets New Look, New Capabilities

Cromemco has released a completely new design of its System Three computer. The new System Three (known as the model CS-3A) includes all the features of the original System Three, such as dual 8-inch floppy disk drives and a 21-slot card cage, as well as new features for in-

on each diskette. A mechanical lever on the front of each drive is used to load or eject diskettes. The interface for these drives is only slightly different from that required for the older Persci drive, and the CS-3A includes a modified 16FDC interface (known as the 16FDC-T) to accom-



creased performance and expandability.

Looking at the System Three, the most obvious change is that the Persci dual 8-inch diskette drive has been replaced with two of the new 8-inch thin-line drives manufactured by Tandon. These drives use a double-sided, double-density recording format for 1.2 megabytes of storage

modate the new drives.

Interfacing the System Three has been made much easier. The rear panel of the machine now includes a removable I/O sub-panel with cut-outs for **twenty** DB-25 connectors (twice the number of the original System Three). Cabling from the I/O interface cards to the I/O sub-panel

Continued on page 16

Personal Computer Tips On Using Your C-10

By Tom McCalmont

Using the Printer to the Fullest

Now that you've become familiar with your new Cromemco C-10 Personal Computer, you undoubtedly want to use it to the fullest in producing hard copy output on the printer. The C-10 can be used with many different printers, including most of those having either a serial interface or a Centronics-compatible parallel interface. In this article, we will assume that you already have

Continued on page 10

An Associative Data Base

By Trone L. Miller

Part II — Technical Description

(Editor's note: In the previous issue —Vol. II, No. 6—we introduced **An Associative Data Base** by Trone L. Miller. This was a non-technical description that intrigued many readers. In that article Miller made reference to a subsequent article that might appeal to "pioneer types." So, for all you pioneers, here is Miller's latest offering.)

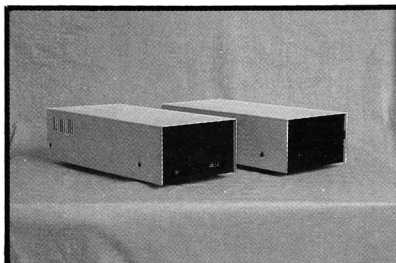
In order to help you create your own version of an associative data base, I will describe the three arrays which do all the work. I leave the choice of language, program flow,

Continued on page 8

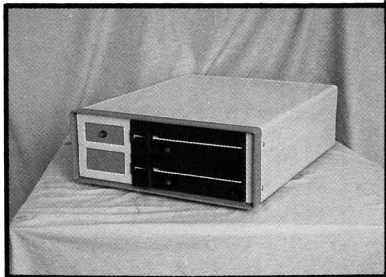
DISK DRIVE SUBSYSTEMS

THE SOLUTION TO DISK STORAGE PROBLEMS

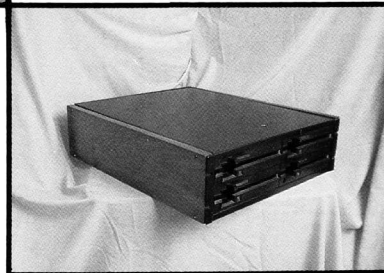
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FEATURES

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I/O News

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input...

Editor:

Sometimes small things can be annoying. Cromemco's gratis form feed upon opening \$LP in 16K Extended BASIC and in 32K Structured BASIC is not my favorite feature—especially when my printer is loaded with labels.

I searched through the I/O News for the fix and since I didn't find it, I thought others might like to see

what I did to fix the "problem."

Page 400 in the Structured BASIC manual describes the area of interest in the I/O Drivers:

```
4ADF 3EOC LD A,ASCFF :ISSUE A FORM FEED ON
:OPENING A FILE
4AE1 CDDA4A CALL $LPPC
```

The instruction, 3EOC, says: load register A with HEX OC, the ASCII form feed character. All we have to do is find this instruction in the program and change it to HEX OO, the ASCII NULL character.

The 4ADF is the address of the instruction but it can vary from version to version—I have version 3.65.

It is probably a good idea to copy the SBASIC.COM file into another file say, FIXSBASIC.COM. Then use DEBUG to find the 3EOC string.

I typed DEBUG FIXSBASIC.COM. The in response to the "—" prompt, I Queried the system for the string in question:

— Q 100 8100 3E OC.

I got three hits with strings beginning with 3EOC but only one at HEX address 3822 where the next byte was CD (see ref. to page 400 above). The two bytes following the CD can vary from version to version too, since they are the absolute location of subroutine \$LPPC. They were HEX 29 and 41 in my version.

Now that the string has been found, it is a simple matter to use the Substitute Memory (—SM) command to replace the OC with OO.

Store the fixed version away with the Write (—W) command, exit DEBUG, and test your fix by running FIXSBASIC and issuing an OPEN 1 "\$LP" command.

Erase SBASIC.COM, Rename SBASIC.COM = FIXSBASIC.COM you're done.

Another nice touch might be to find Structured BASIC's introductory label (around HEX 0540) and replace the trailing blanks with "FF FIXED."

Of course, if you don't want to permanently change the SBASIC program, once you have found the exact location of the HEX OC, you could POKE the address with HEX OO and turn the form feed off in your application code.

I hope this helps someone else who might have had this annoyance.

Sincerely,
George W. Smith, Jr.
Member #00272
Chatham, New Jersey

Editor:

I encountered a small problem on my System 3 that was sufficiently obscure, and yet sufficiently easy to fix, such that it may be worth reporting.

Problem: The key would move from off to lock, and from lock to on, quite well, but would catch, and not move from on to reset.

Solution:

—Turn the key to off.

—Open the cover, and remove the plugs from J7 and J8 on the circuit board that is in back of the key.

—Remove the two screws that go through the circuit board (not the screw that appears in a hole in the circuit board).

—Examine what is in front of you; you will notice a spring-loaded bar that is riding on the top of a strangely-shaped object. Projecting toward you, out of this object, is the piece of shaft that goes in the hole in the circuit board to activate the switch. DO NOT REMOVE ANYTHING!

Using a small mirror, examine the bottom part of the strangely-shaped object. You will notice a small setscrew, that, in my case, had, over the years, worked its way loose enough to impede the rotation of the switch from on to reset.

—Carefully tighten this setscrew so that the surface of the setscrew is below the groove in the strangely-shaped object; that instruction will make more sense when you look.

—Carefully place the circuit board back on the end of the shaft, replace the screws, replace J7 and J8, and you are done.

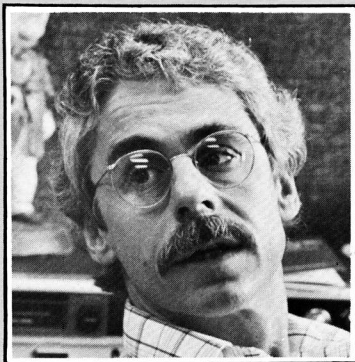
Comment: The problem is caused by the spring-loaded bar, which is the indent for the switch, hanging up in the groove in which it rotates, as it encounters the setscrew.

Sincerely yours,
Peter Zilahy Ingerman
Member #00172
Willingbord, NJ



Kathleen T. Heckman

output



Watch Your Power

Dirty power is a computer-killer, and this issue marks the first time we have carried an authoritative article on this subject. I am very grateful to Ruxton Tucker of Topaz for his contribution, and hope to have more articles in this vein.

I used to believe that anyone with a Winchester disk on a system should have an Uninterrupted Power Supply unit. I now have come to believe, after seeing the power charts produced by the power industry, that no business computer should be installed without a UPS.

So, this is an open plea to such companies as Cuesta, and Gould, and Sola, and even Topaz again to supply us with as much data as they have on this subject. Our function will be to present the information—despite out prejudices in favor of the UPS—in as complete a manner as we can. Given the facts, we think our readers will agree with us.

Crohorts Meeting Big Hit

Just as we were going to press on Volume II, Number 6, we reported that we would be attending a Crohorts meeting at which Dr. Harry Garland, Cromemco's president, would be the guest speaker. Crohorts is, for new readers, an excellent local users' group centered in West Los Angeles. The group possesses a wealth of talent and diverse interests, has built its own software library, and has some members who have written programs that will soon be commercially available.

Anyway, back to the meeting. More than 50, from all over Southern California, attended. Dr. Garland arrived with a prototype C-10 in hand, and within minutes, early arrivals were trying it out. The line at the C-10 grew longer as more arrived.

The meeting was held at the home of Dr. and Mrs. William Cannon who prepared a feast for the occasion. As dinner progressed the crowd became anxious to hear Dr. Garland. Before he had a chance for dessert, it became time for him to speak. He opened with some comments on where Cromemco is going, specifically, the emphasis the company is putting on the C-10 (with allusions to an entire C-Series of products), and the efforts going into the 68000-based systems.

One of the guests asked why Cromemco selected the 68000, rather than the 8086, for which more software is presently available. This question gave Dr. Garland the opportunity to share some of Cromemco's philosophy of long-range development. The 68000 was selected for several reasons and after much testing. For one thing, he noted that about two years down the road the 68020 will be released. The 68020 has 32-bit wide architecture and will be compatible with the 68000. By inference, we can guess that Cromem-

co will be producing such machines and that, given the company's track record of expandability, we will be able to upgrade our systems with the addition of a few choice boards.

Dr. Garland also listed some of the software that comes with the C-10 'Super Pak.' Included with the keyboard, terminal, and disk drive are CDOS, PlanMaster, WriteMaster, MoneyMaster, and even a chess game. As was made very clear, this is, by far, the best bargain in computing available anywhere.

He also noted that software for the 68000 is proceeding, with CROMIX, FORTRAN '77, and PASCAL already released (or releaseable), and with Assembler, a 'C' Compiler, Structured BASIC and COBOL due to be ready within six months.

Other items of interest were the expected releases "sometime in 1983" of a 20 megabyte, five-inch hard disk, an SMD interface card to be able to use large memory devices such as the CDC Phoenix, and a host of other products.

I have heard both Dr. Garland and his co-founder speak on many occasions. I always come away with a feeling of confidence in the future of Cromemco, and somewhat in awe of the thinking—perhaps even the dreams—that propel Cromemco. It was obvious that others in attendance that evening shared in those feelings.

Correction to input

We printed a typo and wish to point out a correction to a letter by Sam Guccione placed in input (Vol. II, #5). Rather than a 74L500, please be sure that the IC34 is a 74LS00 when adjusting it to work under CROMIX. While many of you might have known what chip was meant, we thank the observant member who pointed out the error to us.

CROMIX Drivers Coming

Cromemco advised us last month that a separate manual containing the CROMIX Drivers would be released sometime in 1983. There have been many requests for this information, and software developers will be pleased to know that it is forthcoming...soon.

Richard Kaye
Editor

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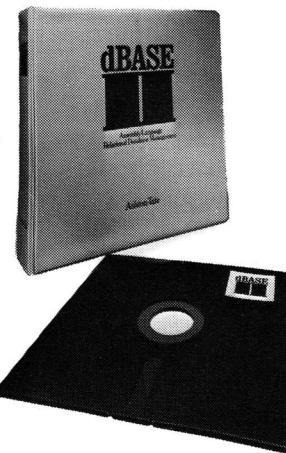
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An Associative Data Base

Part II — Technical Description

Continued from front page

and special features to you. Thus, I leave somewhat of a puzzle for your solution. Those of you who are gnashing your teeth, take heart. There's enough information extant in this article to both reign victorious, and quite possibly come up with better design than I did.

Packing Spaces

The elimination of spaces in storage is desirable because, in standard text, they account for 20% of the characters. I chose to eliminate the spaces by a technique I call "parity packing." When a space is encountered in a string being packed it is not stored. Instead a flag is set and the next non-space character gets its parity bit set. The flag is then cleared until the next space is encountered.

Rule #1 Spaces are not stored. Instead the parity bit of the character following the space(s) is set.

Suggestion: Eliminate Multiple spaces with Rule#1.

Suggestion: Eliminate all leading spaces.

Suggestion: Eliminate all spaces immediately preceeding the terminating punctuation.

The Arrays

There are three arrays identified as A1, A2, and A3 (see Figures 1 & 2). A1 is the Data Base Proper. It stores all input data. A2 stores a pointer for each character in A1. A2 is used in outputting and comparing strings. A3 stores addresses to strings in A1. A3 is used in storing and finding associations.

As an example, suppose we typed in the string 'BANANA?'. The program would search using A1 and A2 until it found the match ending at position A1(21). Next, the program would search the association array for a value of 21. A3(3,1) equals 21, therefore A3(3,2) is equal to the position of an association to be output. Since A3(3,2) equals 11, our output routine would then load the

string ending at position 11. First A1(11) equals 'W', therefore we load our buffer with 'W', then point to the next character in the data base by getting its position from A2(11). Since A2(11) equals 10, our next character 'O' is added to the buffer from A1(10). This process continues until we reach A1(6). After adding the character at A1(6) to the buffer, we find a zero value in A2(6) indicating the buffer is now loaded with the complete string in reverse order. The output routine now displays the string one character at a time in a last-in first-out manner. After this is done, we go on searching the association array (A3) and find another match at position A3(4,1). A3(4,2) equals 15, so our next associated string ends at position A1(15). I leave it to you to output this association.

Suppose the string 'HARD' (see sample session) were input. The only string associated with 'HARD' is 'LEMON CANDY'. The association array A3(6,2) equals 30 which is the position of the string 'HARD', and A3(61) equals 26 which points to the position of the string 'LEMON CANDY'. The string 'LEMON CANDY' can now be stored in the buffer as 'YDNACNOMEL'. But there are two things which should be pointed out. Things go along as before until position A1(22) is reached. Note the value of the next character pointer A2(22). A2(22) equals 5, so the next character to be added to the buffer is at position A1(5) which is the letter 'N' from the word 'LEMON'. Second, the parity bit of the 'C' in 'CANDY' is set. when the output routine detects this it outputs a space before outputting the character. The resulting output will be 'LEMON CANDY'.

Editing

One could write various types of editors for this program but I found a simple replacement editor was sufficient and haven't yet developed anything more elaborate. In this instance a replacement editor consists of a routine which modifies the association array to reflect the new address of the replacement string. To edit an association, one first types in a question. The program then displays the answers associated with that question. The offend-

ing answer can then be replaced by inputting it exactly as displayed (punctuated with a period) and then inputting its replacement.

Efficiency

A1 is a string array (1 byte wide) and A2 is an integer array (2 bytes wide). Consequently, every character stored in the data base requires three bytes. Therefore, fully two thirds of storage is consumed by A2 as overhead. With two thirds (66%) of storage as overhead, the input string must be over 66% redundant before any savings are realized. Indeed, until the data base is large enough to allow an average 66% redundancy rate, it's efficiency is less than standard storage techniques.

Project Agenda

For those of you who are fledgling programmers I would like to suggest an agenda which might be of some assistance to you.

Step #1 Write an input routine which eliminates unnecessary spaces and packs the remainder. (See packing spaces.)

Step #2 Carefully study the relationship between A1 and A2 then write a routine which will take the buffer string from step #1 and store it in A1 while storing the character pointer in A2. (See Fig. 1.)

Suggestion: The array described as A1 could in reality be a string such as A\$ if you are writing the program in BASIC.

Step #3 Write a search routine which will return the ending address of any string stored in A1 and if necessary store the non-redundant portion of the buffer (see Step #1) at the end of the data base. The association array comes next (see Figure #2).

Step #4

Step #5

An editor would now be advantageous. The editor described in this article might be a good place to start. However, if you

decide to use it, please
don't hesitate to
modify it.

Once these routines have been
completed the program will be ready
for testing and expansion.

Sample Session

Assume we wish to store a color
and classification (either hard or
soft) on a number of objects. For
clarity we will start with an empty
data base.

Note: P PERSON
C COMPUTER
P LEMON?
C NO DATA
P YELLOW.
P SOFT.

At this point the data base would
be 'LEMONYELLOWSOFT'. There
hasn't been any conservation of
memory because the input is non-re-
dundant. Note also logic flow within
the program is controlled by the ter-
minating punctuation (period or
question mark).

Rule #2 A question mark, as
the terminating char-
acter of an input
string, indicates a re-
quest for informa-
tion.

Rule #3 A period, as the ter-
minating character of
an input string, is a
request to associate
this string with the
last string used as a
request for informa-
tion. (For an exception -
to this rule see the
section on editing.)

P BANANA?
C NO DATA
P YELLOW.
P SOFT.

The data base is now 'LEMON-
YELLOWSOFTBANANA'. Memory
conservation reused both 'YELLOW'
AND 'SOFT'. 'BANANA', being non-
redundant, was added to the end of
the data base.

P LEMON CANDY?
C NO DATA
P YELLOW.
P HARD.

The data base is now 'LEMONYEL-
LOWSOFTBANANACANDYHARD'.
Memory conservation reused both
'LEMON' and 'YELLOW'. The words
'CANDY', and 'HARD', being non-
redundant, were added to the end
of the data base.

P LEMON?
C YELLOW
C SOFT

The data base has information as-
sociated with 'LEMON' and displays
it when requested.

P YELLOW?
C LEMON
C BANANA
C LEMON CANDY

In this example my computer has
the ability to associate questions to
answers and vice versa. The associ-
ation scheme determines the sophis-
tication of the program and mine is a
rather simple technique so experi-
mentation is encouraged.

In Closing

I realize this approach is unortho-
dox but hope you will enjoy the chal-
lenge of solving the problem. If you
do, then I'm sure this approach will
be more rewarding than simply co-
pying a published listing.

Fig. 1

Pos.	A1	A2
1	L	0
2	E	1
3	M	2
4	O	3
5	N	4
6	Y	0
7	E	6
8	L	7
9	L	8
10	O	9
11	W	10
12	S	0
13	O	12
14	F	13
15	T	14
16	B	0
17	A	16
18	N	17
19	A	18
20	N	19
21	A	20
22	C	5*
23	A	22
24	N	23
25	D	24
26	Y	25
27	H	0
28	A	27
29	R	28
30	D	29

*Parity bit set indicating a packed
space.

Fig. 2

Pos.	A3
1	5,11

2	5,15
3	21,11
4	21,15
5	26,11
6	26,30

About the Author

Trone Miller is founder of Miller and As-
sociates, a High Tech consulting firm in the
Silicon Valley.

Prior to this, he established the Com-
puter Terminal, a computer store located
in Mountain View, and was involved in the
organization of the Western Computer
Dealers Association.

Miller moved to Mountain View from
Nevada, where he was Director of Re-
search at the Nevada Research Institute.

A working copy of Miller's test program
is available on single density diskettes
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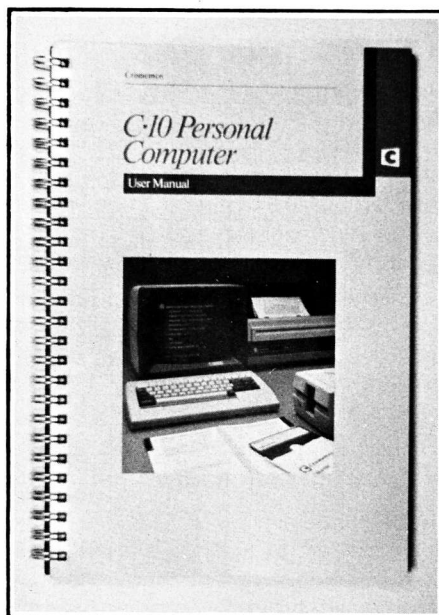
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Tips On Using Your C-10



printer by entering the command "printer" on the keyboard and pressing the RETURN key. Your C-10 will then display a menu of possible printer selections and ask you to pick one. Once you have done this, your C-10 will be configured for connection to the printer you have chosen.

Now that your printer is ready for use, there are several different ways you can produce printed output on it. When using the WriteMaster or PlanMaster programs, you can, of course, print information at any time by means of the print commands built-in to those programs. However, there is also frequently a need to print whatever is being dis-

played on the C-10 screen.

There is a special software printer selection switch built in to your C-10 to do this. This command can be issued from nearly any C-10 function to cause what is currently being displayed on the screen to be printed on the connected printer. This printer selection switch is CONTROL-P, performed by pressing the "P" key at the same time that the "CONTROL" key is being held down. This switch is what is known as a toggle, meaning that each time it is pressed will toggle its previous state. Thus, pressing CONTROL-P once will turn on printed output, and pressing it again will turn off printed output.

Your C-10 also has a way to print the contents of any file on the disk containing text. This is the "Print disk file" command on the C-10 Advanced Functions Menu, function number 12. Once you have selected this function, you will be asked to select a file from those on the disk, and once you have made this selection, it will be printed.

Using one of the three methods described, you should be able to print almost any text or data file you've created with your C-10. You can even print any of the "help" files which come on your C-10 disk. However, there is occasionally a need to use your C-10 more like a typewriter than a word processor. For example, suppose you want to have printed output on a preprinted form such as an invoice or an income tax form. You can turn your C-10 computer into such a typewriter, but to do it, you need to give it some special instructions.

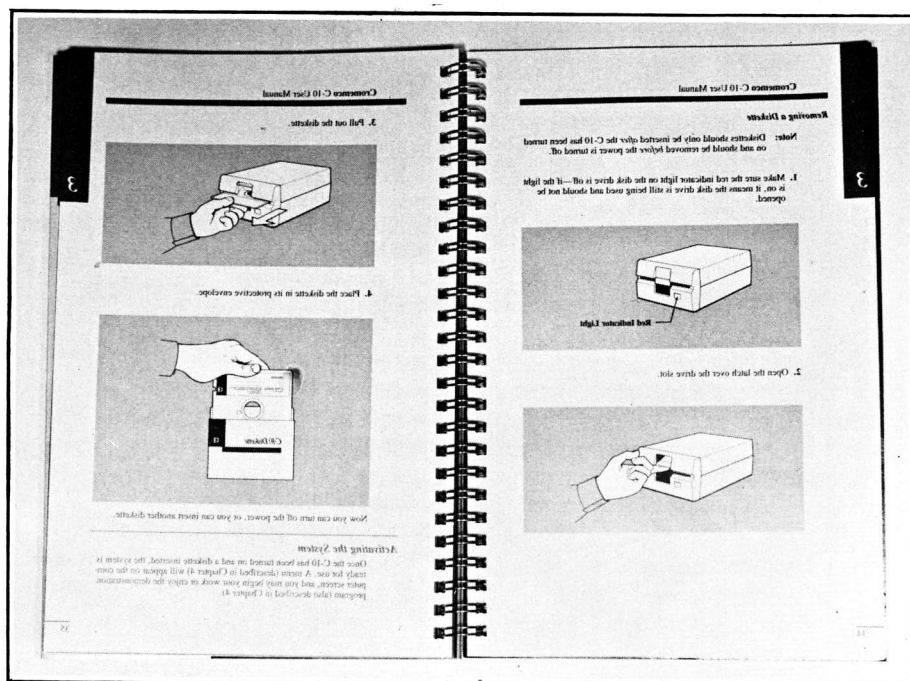
One easy way to do this is to use the Structured BASIC which is supplied on the disk as part of every C-10SP, and write a short program to make the C-10 behave like a typewriter. First, you need to be operating in the Structured BASIC interpreter mode of the C-10. You can do this by selecting function number 5 on the C-10 Main Menu.

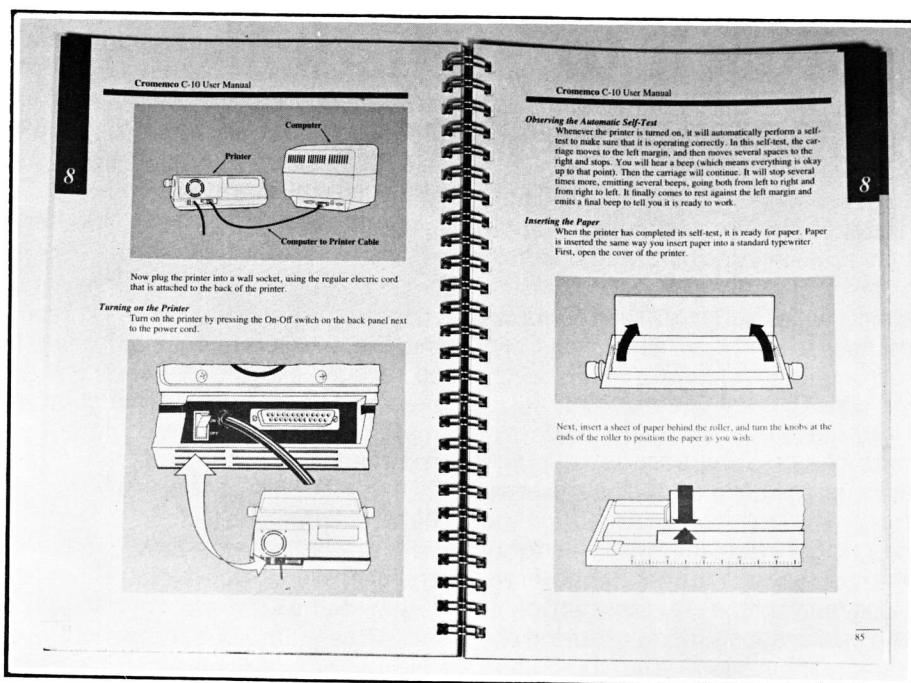
Next, once you see the Structured BASIC ">>" prompt, you can enter the following short program from the keyboard. Simply type in the statements given below (including the line numbers), and end each line by pressing the RETURN key:

```
10 Open\1\ "SLP"
```

such a printer connected to your C-10 by means of a cable plugged into the "Accessory" jack on the back panel.

Following its power-on sequence and initial display of the menu, your C-10 is automatically configured for connection to the Cromemco CLQ printer. You can easily change its configuration to that of another



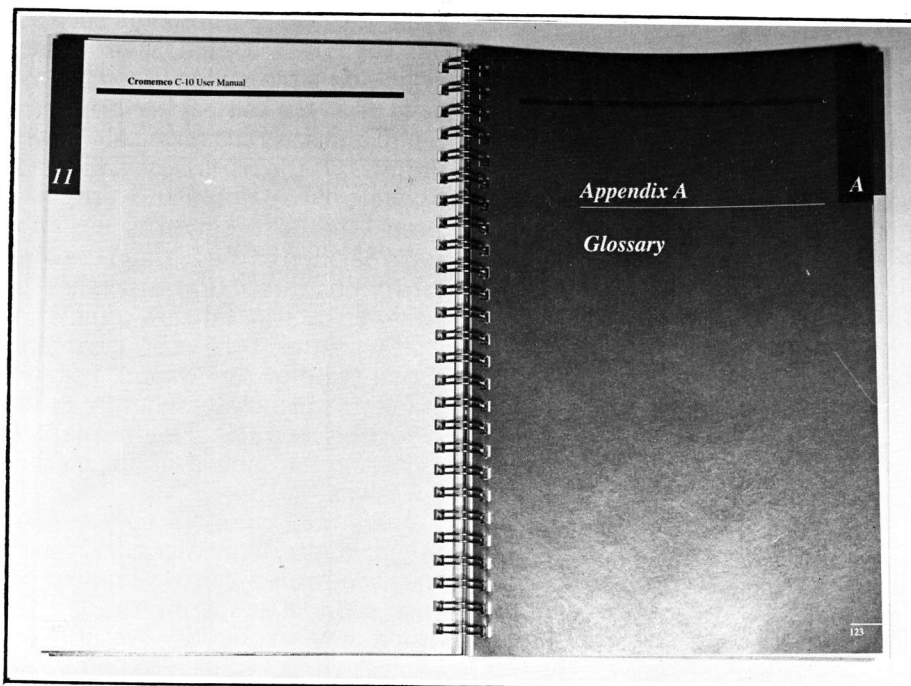


```

20 *Type'character
30 Get\0\Character$(0,0)
40 If Character$(0,0)=Chr$(127)
   Then Character$(0,0)=Chr$(8)
50 Put\1\Character$(0,0)
60 If Character$(0,0)=Chr$(27)
   Then Goto End'type
70 Goto Type'character
100 *End'type
110 Close : End

```

The operation of this program is not too difficult to understand. (This program is designed to work with the Cromemco model CLQ printer and may not work properly with other printers.) The printer and keyboard are being treated as devices connected to your C-10. Line 10 tells BASIC to treat the line printer (or "\$LP") as device number 1. The key-



You can look at your program listing at any time while you are entering it simply by entering the command "list" and pressing the RETURN key.

board of the C-10 is a special device built-in to BASIC as device number 0. Hence, line 30 will get a character from device 0 (the keyboard) and line 50 will output that character to

Continued on page 42



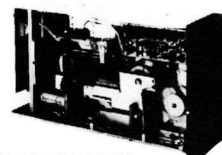
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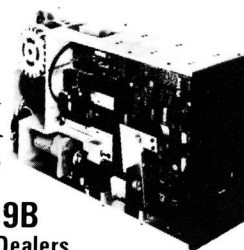
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A New Approach to Statistical-Econometric Systems

By Peter Zadrozny and Jorge Marciano

In the past, those who have needed to perform statistical and/or econometric calculus have had to use existing packages and systems (such as SPSS, SHAZAM and others), or they have had to develop their own programs for specific problems. There has been great inconvenience with using the existing packages because most of them can only be executed on large computers. Also, the User-Program relations with these packages are very cryptic, static and generally difficult to use. In addition, they are batch oriented.

Now there is **THOR**, a statistical-econometric system which is highly interactive, easy to use and powerful. It is designed to run on a micro-computer and will also execute on larger machines. Special attention has been paid to User-Program relations. The system is incomplete, but does propose a new approach.

First, let's look at the core of the system, the statistical variable. Consider that a variable is a group of observations divided into four parts. Part one is its name so that it can be used just by reference to it. The second part is a description which is used to explain in more detail the meaning or contents of the variable. The third part is the base; this is a number which will be associated with the first of the observations. The second observation will be referenced as the observation "base + 1", and so on. This is a very important tool. For example, an economist who has a variable such as the Gross National Product from the year 1950 to 1980, can state the base as 1950. Then he can refer to all his observations by the desired year. In this case, observation 12 will be referenced as 1961. The last part of the variable is composed of the observations themselves.

THOR is interactive in that the user communicates with it by the means of commands. There are three types of commands, and we'll

start with variable related commands.

Variable Related Commands

Assign is the command that permits the creation of a variable and assigns the values of the observations. The user will be asked for the description (which can be empty), the base, the number of observations, and then every observation. If the user makes a mistake during the input of **Assign**, the command **Change** permits him to modify almost any part of the variable (excluding the name). The user can also add and delete observations.

Save permits the user to store the variable on disk (in a particular binary format) for its use later during another session with the system. A saved variable can be loaded in the system by means of the **Load** command. A variable can be deleted from the system by means of the **Erase** command. The user can, at any moment, **List** a variable; the output of this command is composed of the name of the variable, the description, the number of observations, the base and all the observations.

The last command of this group is one that permits the user to transform an ASCII file with numbers into **THOR** format so it can be loaded. The syntax of the commands described above is the following:

```
ASsign var__name
Chang var__name
Erase var__name ... [*]
List var__name ... [*]
LOad var__name ...
SAVve var__name ... [*]
TRans var__name ...
```

The ellipses "..." are used to show that the previous argument-prototype may be repeated. Arguments can be separated by commas ",", while square brackets "[]" around an argument indicate that it is optional. The star "*" indicates all the variables in the system. UPPER CASE characters are used to designate the

most significant characters, meaning the characters that are needed to recognize the command. This is because the system uses a minimum match algorithm to recognize the commands.

General Commands

The first general command will tell the user which variables are in the systems memory, their description, the number of observations, and the base. **Sample** is a command that enables the user to set the lower and higher limits of the sample for the next calculation. Whenever the user desires to omit an observation for the following calculus he may do so through the **Omit** command. This specifies the observation(s) or ranges of observations. The user may want to keep the results of the calculations on paper. This can be done using the command **Print** with some arguments such as **On**, **Off**, **Discard**, and **Save**. When **Print** is on, a file is opened and the results of all the calculations are written to it (also to the terminal). When **Print** is off, the file is closed, spooled to the printer, and afterwards deleted. The **Save** option is used to avoid deletion of the file, and the **Discard** option is used to erase all the file but keep it open. **Info** is a command that will inform the user about the actual state of the system. For example, it will indicate whether **Print** is on or off, and also give information regarding the sample limits and the omissions.

There are two more very important commands in this group, and they are related to the graphing of curves. **Graph** will permit the user to graph any expression. Where an expression is can be any combination of the arithmetic operations with variables in the system, functions and constants. The user may choose between graphing an expression alone or against another expression. Either or both will form a curve, and

the system allows various curves in one command line. **Graph** is designed for a CRT terminal and **Pgraph** for a printer. The difference is that **Pgraph** permits the definition of a title and a legend of curves, and also the size of the graph is user definable. The syntax of these commands follows:

```
Graph expr...[expr : expr ...]
Mem
Info
OMit obs ... [obs - obs ...]
PGraph expr ... [expr : expr ...]
PPrint [on] [off] [s] [d]
SAMPLE lbound, ubound
```

The colon ":" is used to identify that an expression is going to be graphed against another one. Otherwise, the expression is graphed against its associated number (base). The dash "-" is used to specify ranges of observations.

The valid functions are **Log**, defined as the logarithm base 10; **Ln**, defined as the natural logarithm; **Lag**, defined as the lag of observations—used either as **LAG(expr)** or **LAG(expr, N)**. The first case assumes a lag of one observation, while the second case uses **N** as the lagging

factor. The last function is **Delta**, defined as the actual observation minus the preceding one.

Calculus Commands

If you are still with me, then this is the part that you have been waiting for. We will describe only the calculus commands we have implemented and give an overall view of their output. However, we must first introduce you to the intersection of variables. This occurs when an expression is formed by variables that have different numbers of observations and/or different bases. For example, if variable A has 10 observations and the base is 1950, and variable B has 20 observations and a base of 1945, the result of $A + B$ will be a variable with 10 observations and the base 1950 (where observation 1950 corresponds to $A_{1950} + B_{1950}$ and so on). Generalizing this idea, some commands can be affected by **Sample**. For instance, if the limits are 1965 and 1979, the command will respond with a null intersection. If the limits are 1953 and 1959, these will be the ones used over the expression during the calculations.

Anova performs an analysis of variance on the experimental designs where the number of observations per treatment (variable) are equal. If unequal, an intersection is applied. The output includes an Anove table and a list of the treatment means and their number of observations.

Generate permits the user to generate a new variable from expressions based on existing variables or constants. **Olsq** performs an ordinary least squares regression and the output is composed by the regression coefficients, the standard errors and the T values of each of the variables, and the partial derivatives of the coefficients. It also gives the error variance, R square, R bar square, and the Durbin-Watson coefficient of the regression. An advantage is that after its use, there are two new variables **ADJ** and **RES**, which can be used at any moment, and they contain the ADJusted values and the RESiduals of the last regression. **Solsq** is a similar command to **Olsq**, but the output is given at every step of the regression. **Sum-**

Continued on page 13



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A New Approach to Statistical-Econometric Systems

Continued from page 13

mary calculates the standard summary statistics of the variables, and **Times** computes a very simple time series analysis. The syntax of these commands follows:

```
ANova expr ...
GEnerate var__name = expr
OLsq expr = expr ...
SOLsq expr = expr ...
Summary var__name ...
Times var__name ...
```

In the case of **OLsq** and **Solsq**, the expression before the equals sign "=" defines the dependent variable or expression. The expression after it represents the independent variables. The expressions are created temporarily and after the execution of the command they are deleted.

AN EXAMPLE

... insert "A" goes here ...

Implementation

The system was originally designed and implemented on a PDP-11/45 running UNIX. It has been used by the statistics students of

this university since January, 1982. It was later implemented on a Cromemco System-2 with CROMIX. An on-line help manual has been added and is quite similar to the help commands of CROMIX and UNIX. At this implementation, the system has a limit of eight variables, each with a maximum of 100 observations. Many problems exist at this moment with the version running under CROMIX and therefore the desired expansion of the system has been postponed until a new version of C language is available. However, we would like to get more users of this system in order to hear new ideas, bugs advice and more. Therefore, we are offering the system for \$100 until the bugs are fixed. If interested, contact:

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About the Authors

Jorge Marcano is an Economist with an M.A. from the University of Maryland. He is an Associate Professor and Chairman of the Institute of Natural Resources at the Universidad Simon Bolivar in Venezuela. His main interests are research in econometrics and the design and development of economic models.

Peter Zadrozny is a Computer Engineer. System Manager at the Universidad Simon Bolivar, he has been system programmer for a PDP-11/45 with UNIX (the only one in South America). His major interests are operating systems and programming languages.

THOR Statistical-Econometric System

```
. assign test1
Description? Variable 1
Base? 1
Number of obs.? 5
Value of obs. 1? 10
Value of obs. 2? 5
Value of obs. 3? 0
Value of obs. 4? 10
Value of obs. 5? 0
. a test2
^---Ambiguous command
. as test2
Description? Variable 2
Base? 1
Number of obs.? 5
Value of obs. 1? 5
Value of obs. 2? 1
Value of obs. 3? 6
Value of obs. 4? 3
Value of obs. 5? 10
. as test0
Description? Dependent variable
Base? 1
Number of obs.? 5
Value of obs. 1? 17
Value of obs. 2? 10
Value of obs. 3? 12
Value of obs. 4? 16
Value of obs. 5? 20
. sample 100, 120
. solsq test0 = 1, test1, test2
Null intersection-----^
. sam 0
```

```
. solsq test0 = 1, test1, test2
Number of obs. = 5 Limits 1 and 5 Ommited = 0

Regression coefficients with 1 variables:
15.0000
1.7889 Standard errors
8.3853 T values

Partial derivatives of the coefficients:
1.0000

Error variance = 16.0000
R square = 0.0000
R bar square = 0.0000
Durbin-Watson coefficient = 1.3281

Regression coefficients with 2 variables:
14.7500 0.0500
3.0923 0.4610 Standard errors
4.7699 0.1085 T values

Partial derivatives of the coefficients:
1.0000 -0.1111
-5.0000 1.0000

Error variance = 21.2500
R square = 3.9063E-03
R bar square = -0.3281
Durbin-Watson coefficient = 1.3039

Regression coefficients with 3 variables:
4.9500 0.6100 1.4000
2.2707 0.1948 0.2872 Standard errors
2.1799 3.1313 4.8742 T values

Partial derivatives of the coefficients:
1.0000 -0.0688 -0.1120
-9.3478 1.0000 0.8696
-7.0000 0.4000 1.0000

Error variance = 2.4750
R square = 0.9227
R bar square = 0.8453
Durbin-Watson coefficient = 2.2273
```


Number of obs. = 5 Limits 1 and 5 Omitted = 0

Regression coefficients with 3 variables:
3.5500 0.4067 1.4000
2.5286 0.1299 0.2872 Standard errors
1.4039 3.1313 8742 T values

Partial derivatives of the coefficients:
1.0000 -0.0404 -0.1032
-15.3260 1.0000 1.3043
-8.0000 0.2667 1.0000

Error variance = 2.4750
R square = 0.9227
R bar square = 0.8453
Durbin-Watson coefficient = 2.2273

```
. summary test0
Name: test0
Number of observations: 5
Mean of values = 15.0000
Variance = 12.8000
Standard deviation = 3.5777
Absolute deviation = -19969.0000
Relative skewness = -0.0786
Measure of Kurtosis = 1.6455
Estimate of population variance = 16.0000
Estimate of population standard deviation = 4.0000
. erase *
Memory empty
. load liq,comp,gnp,gnpr
. generate defgnp = gnp / gnpr
Description? GNP Implicit price deflator
. mem
Variables in memory:
```

```
Name: defgnp Description: GNP Implicit price deflator
with 32 observations and base 1950
Name: gnpr Description: Real GNP at 1968 prices
with 32 observations and base 1950
Name: gnp Description: Venezuelan gross national product
with 32 observations and base 1950
Name: comp Description: Private consumption
with 32 observations and base 1950
Name: liq Description: Liquidity
with 32 observations and base 1950
```

Total of 5 variables

```
. list gnp
Name: gnp
Description: Venezuelan gross national product
Number of observations: 32 Base: 1950
Observations:
```

Obs 1950 = 10875.000	Obs 1951 = 12364.000	Obs 1952 = 13484.000
Obs 1953 = 14730.000	Obs 1954 = 15786.000	Obs 1955 = 17326.000
Obs 1956 = 20181.000	Obs 1957 = 23848.000	Obs 1958 = 24585.000
Obs 1959 = 24904.000	Obs 1960 = 25671.000	Obs 1961 = 26997.000
Obs 1962 = 29525.000	Obs 1963 = 32186.000	Obs 1964 = 35637.000
Obs 1965 = 37925.000	Obs 1966 = 39516.000	Obs 1967 = 41625.000
Obs 1968 = 44848.000	Obs 1969 = 46867.000	Obs 1970 = 52309.000
Obs 1971 = 57418.000	Obs 1972 = 61797.000	Obs 1973 = 73477.000
Obs 1974 = 1.125E+05	Obs 1975 = 1.183E+05	Obs 1976 = 1.353E+05
Obs 1977 = 1.559E+05	Obs 1978 = 1.710E+05	Obs 1979 = 2.105E+05
Obs 1980 = 2.577E+05	Obs 1981 = 2.910E+05	

```
. sample 1960,1981
. omit 1978
. info
Print is off
The limits of the sample are 1960 and 1981
1 observations omitted:
1978
```

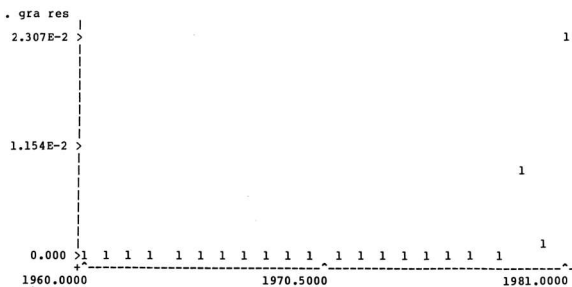
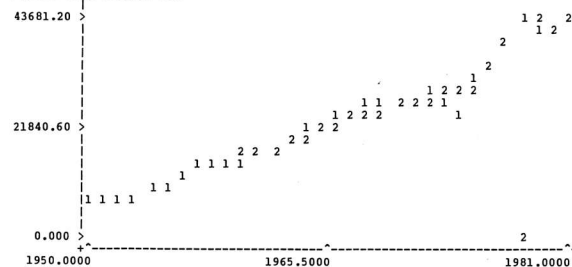
A regression has been made
. ol comp/defgnp=l, gnp/defgnp, liq/defgnp, lag (comp/defgnp)

Number of obs. = 22 Limits 1960 and 1981 Omitted = 1

Regression coefficients with 4 variables:
7499.6700 -0.0279 0.4335 0.5607
2329.8200 0.1003 0.1458 0.1216 Standard errors
3.2190 -0.2783 2.9735 4.6100 T values

Partial derivatives of the coefficients:
1.0000 -3.1967E-05 5.4958E-05 -6.2021E-06
-17258.5000 1.0000 -1.1517 -0.6509
14032.8000 -0.3447 1.0000 -0.0412
-2276.0400 -0.4424 -0.0591 1.0000

Error variance = 2.2120E+06
R square = 0.9718
R bar square = 0.9671
Durbin-Watson coefficient = 2.0800E+30
. graph comp/defgnp, adj



. quit
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System Three Gets New Look, New Capabilities

has also been greatly simplified by use of a hinged cable carrier tray between the card cage (which can slide in and out of the machine) and the rear panel. No longer does the card cage have to be dismantled from the side of the machine in order to add additional I/O cables. Instead the cables are simply strapped into position on the cable-carrier tray as they are required.

Options for the new System Three abound. The basic unit (model CS-3A) comes with a Z80A processor, 64K of memory, and dual 8-inch floppy disk drives. An "H" in the model number indicates that the system comes with a single 8-inch floppy drive and a 5-megabyte Winchester disk drive (Cromemco's model HD-5). A "D" in the model number indicates that the machine uses Cromemco's new DPU dual-processor unit with

both a Z80A and 68000 processor. An "E" in the model number indicates that the machine uses error-correcting memory. So, for example, a model CS3HD5E has a 5-megabyte hard disk, a Z80A/68000 dual processor, and 512K of error-correcting memory. A CS3HD2, on the other hand, includes a 5-megabyte hard disk, dual-processor, and 256K of non-error-correcting memory (using Cromemco's new 256KZ memory card).

As options are added to the System Three, it is important to have sufficient cooling for the system electronics, and in this area the new System Three really excels. The single blade-type of fan which was on the rear panel of the original System Three has been replaced by **three** high-capacity blower-type fans. These blowers are located be-

neath the disk drives and spaced along the length of the card cage. The air flow from these blowers is such that even if all 21 slots of the card cage are filled, the cards run cool to the touch.

Another feature of the new System Three, which will particularly appeal to international customers, is convenient line voltage selection. By just removing the top cover of the System Three and plugging a connector into the appropriate socket you can select operation with a line voltage of from 100 to 130 volts or from 200 to 260 volts at 50 or 60 Hz.

When the System Three was first introduced in 1977, it was considered the "Cadillac" of microcomputers. With the introduction of the CS-3A it is clear that Cromemco intends to keep the System Three in that position for some time to come.



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Easy Directory Check for FORTRAN Users

By Harvey L. Wagner

(Rich Quinn's observation: Similar routines could be done in ASSEMBLY, COBOL, or other compiler-type languages.)

An article in Vol. II, No. 2 of I/O News contained a description of software which permitted a FORTRAN user of CDOS to ascertain whether the file he desired to access was present on the disks currently in use. One drawback to this routine is that it leaves "carcasses" of failed files on the media tested. In many of the applications we have installed on our Cromemco systems here at EROS Data Center, this would result in a great deal of confusion among

our system users, and could well rob the system of file directory space which is critically needed for other purposes.

One method of file checking which does not require that a directory entry actually be created is currently in use on all of our systems. It makes use of an undocumented feature of CDOS version 2.36 which allows the user access to the directory area of a disk through the name SYS.DIR. By using a standard call to SUBROUTINE OPEN with SYS.DIR as the selected file, it is possible to directly check the directory area of a disk from

FORTRAN without having to go through the exercise of creating a non-existent file. What follows is a simple FORTRAN subroutine which utilizes this technique to check for the existence of a file. It is invoked with the call:

CALL CHKDIR(drive,filename,reply)

Where: drive corresponds to the disk drive to be checked, or 0 for default; filename is an 11-byte string identical to the one used in OPEN; reply is the response from the routine, 0 for file not found and 1 for file present.

Current Versions of Cromemco Software

Package	Version	Date Master Created
Accounts Payable	02.65	01/11/82
Accounts Receivable	02.65	01/11/82
'C' Compiler	05.10	02/28/83*
Cromemco Diagnostic System	00.16	02/28/83*
Overlay Linker	01.16	11/12/81
CROMIX	11.11	08/31/82
DBMS/DBR	03.05	01/08/81
Dazzler Graphics	00.09	07/07/80
CDOS	02.54	01/31/83*
Macro Assembler	03.08	01/27/82
16K Extended BASIC	05.70	04/27/81
COBOL Compiler	04.64	01/31/83*
FORTTRAN IV	03.42	09/15/81
RATFOR	01.05	09/15/81
General Ledger System	02.65	01/11/82
IOP Development System	03.00	10/31/82
Inventory System	02.65	01/11/82
KSAM	01.01	12/31/82
LISP	01.08	10/31/82
RBTE	01.06	11/13/81
Super Dazzler Graphics	02.03	01/31/83*
SlideMaster	02.03	11/16/81
SpellMaster	01.19	10/31/82
32K Structured BASIC	03.65	04/24/81
Word Processing System	06.00	01/08/81
WriteMaster	00.49	10/31/82
PlanMaster	02.10	08/31/82
MoneyMaster	00.00	12/31/82
CROMIX 68000	20.09	11/30/82
FORTTRAN '77	01.00	11/30/82
PASCAL 68000	01.00	11/30/82

* Anticipated Release Date

```

C *****
C *
C * SUBROUTINE TO CHECK FOR EXISTENCE OF A DISK FILE *
C *
C * CALLING PROCEDURE: *
C *
C * CALL CHKDIR(DRIVE,NAMBUF,RCODE) *
C *
C * where: DRIVE is disk drive designator *
C * NAMBUF is 11 byte file name string *
C * RCODE is return code; 0 for failed and *
C * 1 for file found. *
C *
C *
C * written by: H. Wagner *
C * USGS EROS DATA CENTER *
C * SIOUX FALLS, S. DAKOTA *
C *****
C
SUBROUTINE CHKDIR(DRIVE,NAMBUF,RCODE)
INTEGER*1 NAMBUF(11),INBUF(128),DRIVE
INTEGER*2 RCODE
IF(DRIVE.LT.0.OR.DRIVE.GT.2)GO TO 200
CALL OPEN(7,'SYS DIR',DRIVE)
10 READ(7,END=200)INBUF
DO 19 I=1,4
IA=((I-1)*32)+1
IF(INBUF(IA).EQ.Z'E5')GO TO 19
ID=0
DO 15 IB=1,11
IC=IA+IB
IF(NAMBUF(IB).NE.INBUF(IC))ID=1
15 CONTINUE
IF(ID.EQ.0)GO TO 210
19 CONTINUE
GO TO 10
200 REWIND 7
RCODE=0
RETURN
210 RCODE=1
REWIND 7
RETURN
END

```

About the Author:

Harvey L. Wagner is a Senior Systems Analyst with Technicolor Graphic Services, Inc., located in Sioux Falls, South Dakota.

END

Product Review of IBM2CPM.COM

By Dr. Chuck Stewart

This is a product review of the Lifeboat release of the IBM-CPM transfer utility.

Package: IBM/CPM Diskette Utility Version 1.1

Distributed by Lifeboat Associates
Price: \$195

Format: 8" SSSD only (IBM compatible disks)

Hardware: 8" SSSD disk drives (2 needed) with CP/M 1.4 or higher and access to an IBM 3741 data entry terminal or equivalent

NOTE: This product will work with CP/M 2.2 or CDOS 2.36

This package fills a great need for the folks who have been renting or leasing that IBM data entry terminal and have made the plunge to a micro with CP/M. If they have had the IBM system for any length of time, they have accumulated a large amount of data that would be useful under the new CP/M system. If they own that IBM system, then they need not lose all that investment. That IBM data terminal may be used as a data entry device for the CP/M computer.

I have had access to an IBM 3741 data terminal and have a Cromemco Sytem Three. The IBM/CPM transfer utility has allowed me to transfer data between the IBM 3741 terminal and the Cromemco. The utility translates the two formats from one format to the other and allows the directory of the IBM disk to be displayed on the CP/M computer.

Use of an IBM compatible disk is required with this utility. The term "IBM compatible" may be interpreted on several levels. A disk is IBM compatible if you can physically insert it into an IBM machine and have the machine accept and read data from the disk. A stricter interpretation of the standard would mean the target machine would generate code readable by an IBM machine on the IBM disks. The term IBM compatible is used in this review to mean a disk that has 77 tracks with 26 software-defined sectors and 128 bytes per sector.

There are three basic differences between the IBM data set and the CP/M operating system in the use of the disk. The first is the character codes used; the second is the record format; and the third is the track usage.

The IBM data set is written in IBM's own Extended Binary Coded Decimal Interchange Code (EBCDIC). A CP/M disk is written in the American Standard Code for Information Interchange (ASCII). These two codes are not compatible.

The IBM data set specifies that the records are a fixed length of 1 to 128 characters. This length is defined in the directory, and all records with fewer characters are padded to that length with spaces. The analogy to records in the CP/M format are lines. The CP/M line can be of variable length and is terminated with a carriage return / line feed pair at the end of each line. The conversion process between the two formats requires padding of the lines to write in the IBM disk format and trailing blank elimination when writing on the disk in the CP/M format.

The directory of the IBM disk is located on track 00(Hex). The CP/M disk will use both 00 and 01 for the directory. A program that will convert from one format to another will require translation from ASCII to EBCDIC and back, and will require that the fixed length records will be converted to the variable length lines of CP/M and back. It will also have to resolve the directory track incompatibility.

I have found that the IBM/CPM utility from Lifeboat does these tasks easily and quickly.

The utility is invoked in the usual CP/M manner by typing IBM2CPM after the CP/M prompt. I quickly renamed the utility to a slothful IBM.COM to speed command entry. The program opens with a short description of itself and the functions available and then displays a menu. The menu has five choices:

```
Format an IBM disk
Read the IBM disk directory
Transfer a CP/M file to the IBM disk
Transfer an IBM file to the CP/M disk
Exit
```

These five selections cover the functions expected from this program. The performance was exactly as specified in the manual. There were no hidden "gotchas" or quirks in the program.

There were three problems noted with the software package:

The first problem was an inadequate explanation in the documentation of the filename expected when requesting an IBM file transfer. If the full name of the file is given, HDR1 DATA for example, the program will respond with "FILE NOT FOUND". The program expects the short form of the name only (DATA). This is assumed and is not mentioned in the manual. A change in the documentation alone will resolve this problem.

The program suffers in not permitting a display of the CP/M directory while in the program. The only way to obtain the CP/M directory of the disk that is being used is to exit the IBM2CPM program, and do a DIR command, then reinvoke the IBM2CPM conversion program. With the number of routines available in public domain that access the directory, there is simply no excuse for this inconvenience.

The program will write only one file from CP/M to an IBM disk. This is a wasteful use of disk space. The program would be improved by allowing multiple files to be written to an IBM disk. This is an inconvenience, but certainly does not mar the overall usefulness of the program.

I use CDOS 2.36 as my variant of CP/M. When I invoked IBM2CPM, I found a menu prompt that states "Presumes use of version 1.4 CP/M". Since CDOS is an offshoot of CP/M, there was concern that there

Product Review of IBM2CPM.COM

might be some incompatibility problems with the program. To my pleasant surprise, there were no problems in the use of any function of the software.

In summary, the software functions exactly as advertised, and I have found no "bugs" in 13 months of use. The program would have been improved with the addition of the CP/M directory access, and the ability to write more than one IBM file. I feel that the product has been well worth the purchase price with the addition of an additional input device for the CROMEMCO.

About the Author

Dr. Chuck Stewart is a full-time Emergency Physician who uses his systems for medical research, literature searches, and general programming. He has teaching credentials in college level data processing, and an undergraduate degree in engineering. His interests obviously span a wide field.

In addition to the System Three noted in the article, he has a highly modified System Two in a TEI mainframe, Hazeltine 1500 terminal, and an EPSON printer. His System Three is almost four years old and sports a DC Hayes Micromodem, two TUARTS, is operated from a Zenith Z19 terminal, and uses two printers: a TI-810 and a Diablo 1620.

Dr. Stewart has generously offered to review any hardware or software related to the medical field. Please send any comments for him to I/O News. We will forward.

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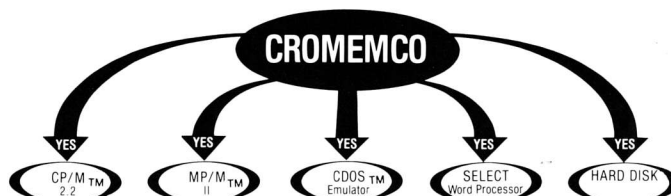
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Microcomputers Can Operate Without Downtime

By Ruxton Tucker

Computers and sensitive computer-based equipment require clean, stable AC power in order to operate properly. But the electrical power supplied by utility companies typically is neither clean nor stable: electrical interference (noise) continually enters power lines and voltage levels frequently change. Voltage is sometimes completely interrupted for intervals lasting longer than 15 milliseconds. These power disturbances can seriously impair the performance of sensitive electronic equipment.

Envision, if you will, the owner/manager of a small business working late to load customers names into a recently acquired microcomputer. Tedious work? Yes, but the effort will provide an easily used mailing list for promotional purposes. Right after spending many, many hours at the task it is realized that almost three hundred names are lost on the disk memory. Somehow, the address to this block of names has been lost or changed. The manager's first reaction is to blame this problem on an equipment failure, but spurious failures such as the one described are most likely caused by spurious incidents. In this case a momentary power failure caused the magnetic memory to write over the address thereby changing it to unrecognizable data. The owner/manager must now repeat many of the hours already spent in loading these customer names, which creates an additional cost and a delay in the planned promotions.

If these events occurred only rarely, or only at particular locations within the power grid, the situation might not be problematical. However, a recent study by engineers of the Bell Telephone Laboratories reveals that the occurrences of these problems are numerous and typical anywhere within the power grid.

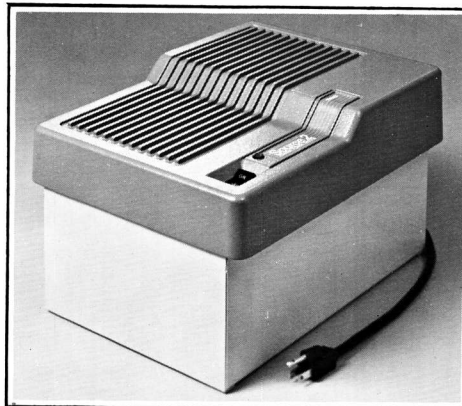
Bell Laboratories engineers carefully selected study locations so as to represent a cross section of geo-

graphical locations and Bell System companies. Twenty-four sites from Boston to San Antonio were studied. Each site was monitored for an average of 11.3 months to account for seasonal variations that could affect disturbance data. Together the sites were monitored for a total of 270 months.

The data taken from these locations indicated there were four principal types of power disturbances: voltage dips characterized by momentary drops in power-line voltage; impulses characterized by momentary spikes occurring in the power-line voltage; surges or momentary overvoltages in the power-line voltage; and power failures which are actual outages or zero voltage conditions. Of the four types only voltage dips and power failures were noted to cause immediate computer malfunctions. Typically, whenever the power-line voltage dropped below 96 volts for as little as one cycle of power-line frequency computers were out of service for an average of two hours. Even though some impulses were measured to be as high as 1,000 volts and several power surges reached well above 150 volts no immediate computer malfunctions were noted. However, the Bell Laboratories engineers made it clear that these high voltage impulses and surges would degrade critical computer components such as semiconductors and integrated circuits,

thereby increasing the likelihood of future computer shutdowns. The Bell Laboratories engineers made statistical predictions based on the test data. They predicted that 90% of the locations would see a maximum of 50 voltage dips per year, wherein the voltage on the power line would drop below 96 volts. They further predicted that 90% of their locations would see a maximum of 12 power failures where the voltage dropped to zero for at least one cycle of power-line frequency. (Other studies have shown that 90% of all power failures last for a period of less than 10 minutes.) Therefore, any of these locations will typically see 62 aberrations on the power line each year which will cause a computer to shut down for a period of approximately two hours. This averages out to five times a month or more than once each week that a scenario like that described earlier could take place.

The solution to this problem is obvious. What is needed is some sort of interface between utility-supplied power and the microcomputer which will eliminate three of the four kinds of power-line problems described by the Bell Telephone Laboratories. (The incidence of power-line surges was inconsequential, and so the cost of solving this apparent non-problem has been deferred to only those locations where a surge may occur.) The needed interface should remove impulses to protect the semiconductors within the microcomputer, prevent the voltage from dipping below 96 volts during a momentary sag, and finally, supply AC power to the microcomputer during the numerous voltage outages which last for a time period exceeding one cycle of power-line frequency. A noise attenuator and a voltage regulator will perform the first two functions. However, in order to provide power to the microcomputer after the utility power source has failed requires some sort

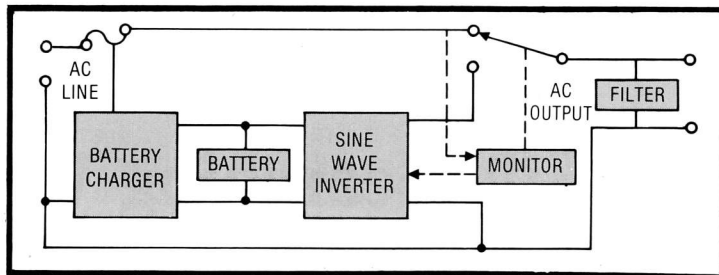


of energy storage device. Batteries are the most cost-effective method for providing this standby energy source. As a matter of fact, an AC standby power source, if properly designed, can provide adequate protection from all of the above mentioned forms of power-line aberrations that affect computers.

An AC standby power source consists of a battery, a battery charger, an inverter to change the DC battery power to AC power and, finally, a static transfer switch which automatically transfers the source of power to the microcomputer from the power line to the inverter when the power line falls below 96 volts for any reason. (See figure 1) The static transfer switch must be fast enough to make this transfer in less than one cycle of power-line frequency. (At 60 Hz, one cycle has a time period of 16 milliseconds.) Transfer switches are available which will make this transfer in a maximum period of 10 milliseconds with a typical transfer time of 6 milliseconds. Finally, a noise attenuator must be applied to the AC power line to prevent impulses from reaching the microcomputer during normal operation. With such a system impulses, voltage sags and outages, all of which are ordinary and frequent occurrences on utility-supplied power, would be automatically eliminated from the microcomputer AC power source.

A standby power supply was selected over an uninterruptible power supply to keep the cost of protection to an absolute minimum. The components of a standby power system (sometimes known as an off-line uninterruptible power supply) operate in an idle or at-rest mode during most of the life of the system. The standby power system is only required to provide energy to the microcomputer during those brief periods when the voltage has sagged or during a power outage. Therefore, very high reliability and high efficiency can be obtained at a relatively low price since the components of the system very rarely see stress.

In summary, microcomputers, especially those used in business applications, are likely to exhibit costly time consuming problems due to reactions to power-line disturbances



About the Author:

that occur many times each month. Commercially available power conditioners will suppress impulses and correct for voltage sags and surges but will not protect user equipment from outages. However, a properly designed standby power system will provide protection from all forms of power-line problems at a reasonable cost, adding less than 10% to the cost of the small business computer. This cost is easily justified when compared to the cost of downtime and lost input which create disruptions to the normal flow of business. For peace of mind and smooth computer operations, consider some form of power conditioning when installing any business computer.

Ruxton Tucker has worked in the power conditioning field since 1961. The first ten of those years were spent in engineering design and the remainder in marketing and sales. Since 1977, Tucker has been Director of Marketing for Topaz, Inc., a firm which designs, manufactures and markets a broad line of power conditioning equipment. Tucker has received a Bachelor of Science Degree in Electrical Engineering and a Master's Degree in Business Administration.

Tucker indicated he is willing to answer any questions regarding power problems. He may be contacted at the following address: Ruxton Tucker TOPAZ, INC. P.O. Box 81187, San Diego, CA 92138, (619) 571-5622



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File Searching With Position

By Bruce Bowditch

Editor's note: We submitted this article to Richard Quinn, editor of 'tec tips', who had the following comments:

This is a good article showing some creative sorting routines for those who use 16K or 32K BASIC. One nice thing about this technique is that search time (especially important in multi-user CROMIX) is **not** affected by the size of records in a data file.)

This method of file searching in BASIC I feel is novel. It was developed out of the necessity of handling an inventory of more than 800 products which are being added to all the time. Some of these new products are "perpetual" but others are custom manufactured. Manufacturing data has to be processed daily in batches by production teams.

The particular advantages of this method are:

1. Short, simple, easy to understand coding.
2. It's fast. When a team changes its production program, the operator enters the "new" product codes and the program "immediately" returns a product description to confirm the description entered on the day sheet. Many products are very similar and descriptions on the day sheets are often inadequate.
3. The master file does not have to be sorted. Despite this, I use a program at the end of each month to build a new sorted monthly tally file and search string file. Until any new products are brought into production the search is done completely in memory with the POS function and, best of all, **ONLY ONE SEEK** is required to access the tally file.

4. Reading past the "month beginning" end of the tally file means that I only update the tally file monthly. This represents quite a savings in "housekeeping" effort.

5. Fewer seeks mean less waiting at the terminal.

First, refer to the article by Chris Rook in I/O News (Vol. I, Number 3) which shows how record fields can be read into a string. This technique, combined with the position command, provides the basis for this relatively simple but fast method of record searching in BASIC.

To illustrate the method, assume that you have an inventory system where product details are recorded in a data file, GM.DAT. The first field in a product record is a six character stock code of the form NN.nnn, where NN are two characters representing the product group and nnn are three characters identifying the product within the group. The remaining fields contain the product descriptions, prices, stock levels, etc. The decimal point makes the code more readable, but as will be seen later, it also serves as a delimiter during record searching.

When a new item comes into stock, it is allocated a unique stock code and a new record is written into the data file. A sort file may be maintained, but the actual data records are not ordered. The first record of the data file, record 0, holds a five character field commencing at byte 0, to indicate the next available record number.

Listing 1 is a short BASIC program, which reads the data file sequentially and writes the stock codes into GMSRCH.DAT. The length of each record is 6 bytes, equal to the length of the stock code, and record 0 holds

a 5-character field which indicates the number of records written to GMSRCH.DAT. The file is not ordered but record R of the search file GMSRCH.DAT holds the same stock code as record R of the data file GM.DAT. If all the records of GMSRCH.DAT are read sequentially into a string, then the relative positions of the substrings will be identical to the relative positions of the data base records.

Listing 2 is portion of an application program. At subroutine 500, the search file is read and the stock codes are stored in memory as substrings of the search string C2\$. The position command at line 610 determines the position of any substring within C2\$ and line 630 converts the returned value into an actual record number. The required data file record can then be accessed with **ONLY ONE SEEK**.

If the stock code input at line 80 has not been allocated when GMSRCH.DAT is written, the POS will return the value - 1 to indicate that the substring has not been found. Then if the number of records currently in the data file (L1) is greater than the number of records originally read into GMSRCH.DAT (L2), the tail of the data file can be read sequentially (lines 650 to 690) until the record is found or the end of the file is reached. Only **ONE INITIAL SEEK** is required to commence an exhaustive but brief sequential read. The average number of sequential reads, $(L1-L2)/2$, can be reduced if GMSRCH.DAT is updated at convenient intervals.

The search will return in a unique solution if all stock codes and substrings are unique. In the above example, the decimal point in the code has the same effect as a delimiter, in

that every code must contain only one uniquely located decimal point. If the stock codes on file are 01.010, 01.011, ... 10.100, 10.101, 10.102, ... then the search string reads 01.01001.011 ... 10.10010.10110.102 ... and the position of 10.100 is unique. But if the codes read 01010, 01011, ... 10100, 10101, 10102, it can be readily seen that the position returned for 10100 depends upon the starting point of the search.

The technique of developing a string of record search keys and determining the record number with the position command can be used with any ASCII data file. Shorter search keys require less memory, but the risk of ambiguity increases. Where memory space is critically short, it may be necessary to tolerate a greater risk of ambiguity in the initial search. In this case, the program can be modified to perform a full check on any record which satisfies the search criteria. If the POS segment does not find the record, a sequential search of the tail of the data base file will be mandatory. The search will still be relatively fast, drive access will be minimal, and the

data file need not be sorted. The name field of a name and address file should be written:

KEYNAME, OTHER NAMES and a delimiter, such as an "*", must be included in the substrings, e.g. "Bill Harrison" may be recorded as HARRISON, BILL and a 6-character substring including delimiter could be HARRI*. If the KEYNAME is very short, the read algorithm must sense the delimiting "*" after the KEYNAME and pad out the substring with blanks — the length and delimiting character of all substrings must be identical. Consideration should also be given to using upper case only.

LISTING 1

```
10 REM—BUILD A SEARCH FILE
20 SET 0, - 1
30 DIM R$(4), C$(5)
40 OPEN\1,80,1\ "GM.DAT"
50 GET\1,0,0\R$
60 L = VAL(R$) - 1 : R$ = STR$(L)
70 CREATE "GMSRCH.DAT"
80 OPEN\2,6\ "GMSRCH.DAT"
90 PUT\2,0,0\R$(-1), " "
100 R = 1
110 GET\1,R,0\C$
120 PUT\2,R,0\C$(-1)
```

```
130 R = R + 1 : IF R = L + 1 THEN END
140 GOTO 110
```

LISTING 2

```
10 DIM R1$(4), R2$(4), C$(5), C1$(5)
20 SET 0, - 1
30 REM — READ SEARCH STRING
40 GOSUB 500
50 OPEN\1,80\ "GM.DAT"
60 GET\1,0,0\R1$
70 L1 = VAL(R1$) - 1
80 INPUT "STOCK CODE xx.xxx ? " , C$
90 IF LEN(C$) # 6 OR C$(2, - 1) # " " THEN 80
100 GOTO 600
110 REM-CONTINUE APPLICATION
.
.
.
500 OPEN\2,6,1\ "GMSRCH.DAT"
510 GET\2,0,0\R2$
520 L2 = VAL(R2$)
530 DIM C2$(L2*6 - 1)
540 GET\2,1,0\C2$
550 RETURN
600 REM — FIND RECORD NUMBER
610 R = POS (C2$, C$, 0)
620 IF R = - 1 THEN 640
630 R = 1 + R/6 : GOTO 110
640 IF L2 = L1 THEN 700
```

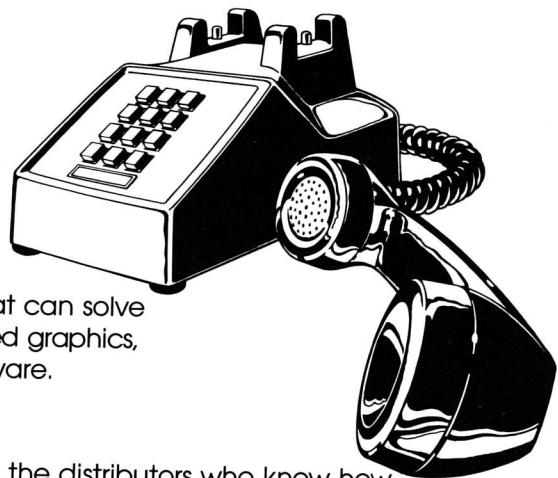
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Additional information can be obtained by contacting Dr. Greg Clements, SoftTec, Inc., P.O. Box 2863, 336 S. Clinton Street, Iowa City, Iowa 52244. Phone (319) 354-8522.



File Searching With Position

Continued from page 23

```
650 REM — MORE RECORDS
660 FOR R=L2 TO L1
670 GET\1,R,0\C1$
680 IF C$=C1$THEN 110
690 NEXT R
700 @ : @C$;" NOT FOUND" :
    @ : GOTO 80
```

About the Author

Bruce Bowditch is a microcomputer user who resides in a sparsely populated area of Australia. He is working on a listing for this program which will contain further details and has indicated that he would be happy to supply members with it in exchange for a swap of 16K BASIC sub-routines. He can be reached at:

P.O. Box 276
MENTONE, 3194.
Australia



Cromemco Expands U.S. Branch Offices

As anticipated, Cromemco opened its Chicago-area branch office in December. Appropriately named Cromemco-Chicago, the new facility is staffed by Ralph Nicksarlian, Central Regional Director, and Gary Stephens, Technical Support Manager.

This brings the total number of U.S. branch offices to three opened during 1982. Others are planned, but the exact locations and opening dates are yet to be determined.

The first office opened was in Burlington, Massachusetts, a Boston suburb. It is staffed by George Brandt, Eastern Regional Director,

and Jerry Adams, Technical Support Manager, and is located at 50 Mall Road, Suite 100 in Burlington. The phone number is (617) 229-2680.

The second branch was opened in October in Atlanta, Georgia. Manned by Len Rothman, Southern Regional Director, and Rick Dhaenens, Technical Support Manager, the office is located at 1150 Hammond Drive, Suite D4245 in Atlanta. The phone number is (404) 391-9433.

Cromemco-Chicago's address is 1900 East Golf Road, Suite 100, Schaumburg, Illinois 60195. The phone number is (312) 490-0850.



Conditional for CDOS ".CMD" File

By Peter Zilahy Ingerman

I recently became annoyed with the batch facility under CDOS. My annoyance sprang from my use of a ".CMD" file to do assemblies, where, under some circumstances, I wished to print the results of the assembly, while under other circumstances I did not.

Since I do not have a real time clock on my system, but desired to have the assembly listing dated and time-stamped, if I printed it, I used the

"STAT/DT" command to set the internal registers, so that the assembler would pick them up.

However, in the case when I was not listing, this meant that I had to pay attention to the computer, to provide it with the input it expected for the "STAT/DT" command, even when I was not printing.

I enclose my solution to the problem. It is a program named "IF". It is called with a line with the following

form:

IF s1-s2 command
with the interpretation that if the string represented by "s1" and the string represented by "s2" are identical, then the "command" will be executed. Note that parameters for the "command" may follow the "command".

I enclose a listing, which, since it is only five pages, may be short enough for you to consider including in I/O News.

```
0000' 49462028 0005 MSG: DB 'IF (Conditional Execute) Version'
0021' 312E3038 0006 DB '1.08' ; Version number
0025' 0D0A 0007 DB '\R\L'
0027' 436F7079 0008 DB 'Copyright © 1982 by Peter Zilahy Ingerman\R\L'
0054' 0D0A 0009 DB '\R\L'
(0056) 0010 MSGL: EQU $-MSG
```

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☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆
☆ This process works only for CDOS 1.07 and above. ☆
It does NOT work with CROMIX.
☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆

```
0021 LIST NOGEN ; Don't list expanded macros

System equates

(0080) 0025 CCNT: EQU 080H ; Count of command line
(0081) 0026 CLINE: EQU 081H ; Start of command line buffer
(005C) 0027 FCB1: EQU 05CH ; Start of 1st FCB
(005D) 0028 FCB1N: EQU 05DH ; Start of name in FCB
(0006) 0029 FREE: EQU 006H ; Pointer to first free location
(0008) 0030 SYSTEM: EQU 008H ; Byte identifying system
0031 ; -1 for CDOS
0032
(0000) 0033 EXIT: EQU 0 ; Program abort JUMP location
0034
(0005) 0035 CDOS: EQU 5 ; Entry point for CDOS
(0002) 0036 CONWRT: EQU 2 ; Write to console
(0088) 0037 LINK: EQU 136 ; CDOS call to link
(008D) 0038 WHATV: EQU 141 ; Get CDOS version

Resinings of Program

0056' ED7B0600 0042 START: LD SP,(FREE) ; Move stack pointer in case
005A' 0656 0043 LD B,MSGL ; Load with message length
005C' 210000' 0044 LD HL,MSG ; Pointer to message
005F' CD3801' 0045 CALL OUTMSG ; Display the message
0046
0062' 3A0800 0047 LD A,(SYSTEM)
0065' 3C 0048 INC A
0066' C24D01' 0049 JP NZ,E2 ; ABORT --- using CROMIX
0050
0069' 0E8D 0051 LD C,WHATV ; Are we in right version?
006B' CD0500 0052 CALL CDOS ; Get version into BC
006E' 210601 0053 LD HL,0106H ; That's 1 in B, 06 in C
0071' B7 0054 OR A ; Set C flag off
0072' ED42 0055 SBC HL,BC ; Subtract
0074' D24201' 0056 JP NC,E1 ; ABORT --- wrong version
0057
```

Continued on page 26

Conditional for CDOS ".CMD" File

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Conditional for CDOS ".CMD" file

Nov 12, 1982 14:34:00

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```

0077' 3A8000    0058    LD    A,(CCNT)    ; Get count from command line
007A' 0600      0059    LD    B,0        ; Extend it to BC
007C' 4F        0060    LD    C,A
007D' 218100    0061    LD    HL,CLINE    ; Address of first character
0080' 09        0062    ADD    HL,BC      ; Address of end sentinel
0081' 7E        0063    LD    A,(HL)     ; Should be an end sentinel
0082' B7        0064    OR     A
0083' C28F01'   0065    JP     NZ,E8      ; ABORT --- malformed command
                                0066
0086' 3E3D      0067    LD    A,'='      ; Get separator character
0088' 218100    0068    LD    HL,CLINE    ; Start of chars on command line
008B' EDB1      0069    CPIR           ; Search for separator
008D' C25801'   0070    JP     NZ,E3      ; ABORT --- no "="
                                0071
0090' 3A8000    0072    LD    A,(CCNT)    ; Get count again
0093' 91        0073    SUB    C          ; Subtract what's left on line
0094' 47        0074    LD    B,A        ; and put count of chars to
                                ; left of '=' into B
0095' 05        0075    DEC    B
0096' EB        0076    EX     DE,HL     ; Move RIGHT pointer to DE
0097' 218100    0077    LD    HL,CLINE    ; Set up LEFT pointer
009A' 3E20      0078    LD    A,' '      ; Compare with a space
                                0079
                                0080    ; Now find the left-most non-space on the left side of
                                0081    ; the '=' sign
                                0082
009C' BE        0083    L1:    CP     (HL)    ; Compare next LEFT character
009D' 2006      0084    JR     NZ,L2      ; Go at first non-space
009F' 23        0085    INC    HL        ; Step pointer
00A0' 10FA      0086    DJNZ   L1        ; Go back to try again
00A2' C36301'   0087    JP     E4        ; ABORT --- nothings to left of '='
                                0088
                                0089    ; Loop to compare LEFT and RIGHT strings
                                0090
00A5' 1A        0091    L2:    LD    A,(DE)    ; Get a RIGHT character
00A6' BE        0092    CP     (HL)    ; Compare with a LEFT character
00A7' C28401'   0093    JP     NZ,E7      ; TERMINATE --- compare is unequal
                                0094
00AA' 13        0095    INC    DE        ; Increment RIGHT pointer
00AB' 23        0096    INC    HL        ; Increment LEFT pointer
00AC' 10F7      0097    DJNZ   L2        ; Go back for next character
                                0098
                                0099    ; Clear the FCB, since we are going to need it
                                0100
00AE' 215C00    0101    LD    HL,FCB1    ; Pointer to start of FCB
00B1' 3600      0102    LD    (HL),0    ; Initially, use current disk
00B3' 23        0103    INC    HL        ; Now point to name
00B4' 0608      0104    LD    B,8        ; Length of name field
                                0105
00B6' 3620      0106    L3:    LD    (HL),' ' ; Fill char for name is a space
00B8' 23        0107    INC    HL        ; Step to next character
00B9' 10FB      0108    DJNZ   L3        ; Continue the fill
                                0109
00BB' 3643      0110    LD    (HL),'C'   ; Fill in the required extension
00BD' 23        0111    INC    HL        ; (obviously, '.COM')
00BE' 364F      0112    LD    (HL),'D'
00C0' 23        0113    INC    HL

```

CROMEMCO Z80 Macro Assembler version 03.08
Conditional for CDOS ".CMD" file

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```

00C1' 364D      0114    LD    (HL),'M'
                                0115
                                0116    ; RIGHT pointer now points to first char after right string
                                0117
00C3' EB        0118    EX     DE,HL    ; Put RIGHT pointer in HL
                                0119
                                0120    ; Step RIGHT pointer to first non-space
                                0121
00C4' 7E        0122    L4:    LD    A,(HL)    ; Get character
00C5' FE20      0123    CP     ' '
00C7' 2003      0124    JR     NZ,L5      ; Go if non-space
                                0125
00C9' 23        0126    INC    HL        ; Step the RIGHT pointer
00CA' 18FB      0127    JR     L4        ; Go back and try again
                                0128
                                0129    ; See if there is work to do
                                0130
00CC' C81B01'   0131    L5:    CALL  ENDNAM    ; Set Z flag if end of name
00CF' CA6E01'   0132    JP     Z,E5      ; ABORT --- no name at all!
                                0133
                                0134    ; Load the file name into the FCB, allowing for drive
                                0135
00D2' 115D00    0136    LD    DE,FCB1N    ; Point to start of name
00D5' 12        0137    LD    (DE),A    ; Store the first character
00D6' 13        0138    INC    DE        ; Increment the pointers
00D7' 23        0139    INC    HL
00D8' C81101'   0140    CALL  FIX        ; Get a character and convert it
00DB' FE3A      0141    CP     ':'
00DD' 200B      0142    JR     NZ,L7      ; Go if not a drive designator

```


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00DF' 1B      0143      DEC DE      ; We overshoot, so back up
00E0' 1A      0144      LD A,(DE)    ; Get the drive char back
00E1' D640    0145      SUB 'A'-1    ; Convert char to drive
00E3' 1B      0146      DEC DE      ; Back up pointer to drive
00E4' 12      0147      DEC DE      ;
00E5' 13      0148      LD (DE),A    ; Store the character
00E6' 23      0149      L6: INC DE    ; Increment the pointers
00E7' CD1101' 0150      INC HL      ;
00EA' CD1E01' 0151      CALL FIX     ; Get a character and convert it
00EB' 20F5    0152      CALL ENDNAM  ; Set Z flag if end of name
00ED' 20F5    0153      JR NZ,L6     ; Go if not end of name
00EF' 44      0154      LD B,H      ; Move pointer to BC --- it points
00F0' 4D      0155      LD C,L      ; to the char following name
00F1' 11B100  0156      LD DE,CLINE ; First char on command line
00F4' 3E20    0157      LD A,' '    ; Get a space to A
00F6' 12      0158      LD (DE),A    ; Store it as first char
00F7' 13      0159      INC DE      ; Increment pointer
00F8' 218000  0160      LD HL,CCNT  ; Command line count
00FB' 3601    0161      LD (HL),1   ; Clear the count
00FD' 0A      0162      LD A,(BC)   ; Get a character and move it to
00FE' 12      0163      LD (DE),A    ; the new place on the line
00FF' B7      0164      OR A        ;
0100' 2805    0165      JR Z,L9     ; Go if end sentinel moved
0101' 2805    0166      JR Z,L9     ;

```

CROMEMCO Z80 Macro Assembler version 03.08
 Conditional for CDOS ".CMD" file

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```

0102' 03      0170      INC BC      ; Increment pointers
0103' 13      0171      INC DE      ;
0104' 34      0172      INC (HL)    ; and counter
0105' 18F6    0173      JR L8       ; Go back for more work
0106' 18F6    0174      JR L8       ;
0107' 115C00  0175      L9: LD DE,FCB1 ;
010A' 0E88    0176      LD C,LINK   ;
010C' CD0500  0177      CALL CDOS   ;
010F' 1868    0178      JR E6       ; ABORT --- no such program
0110' 1868    0179      JR E6       ;
0111' 1868    0180      JR E6       ;

```

Subroutine to set char pointed to by HL and convert to UC

```

0184 FIX:     ; On entry
0185           ; HL set to point to desired character
0186           ; On exit
0187           ; A contains character, converted to UC if needed
0111' 7E      0188      LD A,(HL)   ; Get character
0112' FE61    0189      CP 'a'      ;
0114' D8      0190      RET C        ; Not big enough to be LC
0115' FE7B    0191      CP 'z'+1    ;
0117' D0      0192      RET NC      ; Too big to be LC
0118' D620    0193      SUB 'a'-'A' ; Conversion factor
011A' C9      0194      RET

```

Subroutine to check for end of file name

```

0198 ENDNAM:  ; On entry
0199           ; A contains character to be checked
0200           ; On exit
0201           ; Z flag set if end of name reached
011B' 0202    IRPC  #A,'$*?=/,.; ' ;
0203          CP  #A'              ;
0204          RET Z                ; Return if '#A'
0205          MEND
0136' B7      0224      OR A        ; Set Z flag if zero
0137' C9      0225      RET

```

Subroutine to output message to console

```

0229 OUTMSG:  ; On entry
0230           ; B contains length of message
0231           ; HL points to first character of message
0138' 0E02    0232      LD C,CONVRT  ; Set up to output
0233
013A' 5E      0234      LD E,(HL)   ; Get character
013B' CD0500  0235      CALL CDOS   ; Output the character
013E' 23      0236      INC HL      ; Step pointer
013F' 10F9    0237      DJNZ OUT1   ; Go back if more chars
0141' C9      0238      RET

```

Assorted error messages and exits

```

0242 DEPART:  MACRO  #A,#B
0243 E#A:      LD     HL,EXIT      ;; Set up exit in stack

```

Continued on page 28

Conditional for CDOS ".CMD" File

Continued from page 26

CROMEMCO Z80 Macro Assembler version 03.08
Conditional for CDOS ".CMD" file

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```
0244      PUSH    HL
0245      LD       B,M#AL      ;; Get length of message
0246      LD       HL,M#A      ;; Get pointer to message
0247      JR       OUTMSG      ;; Punt
0248      DATA
0249 M#A:   DB       #B        ;; Switch to data area
0250      DB       'R\L'        ;; Message
0251 M#AL:  EQU      $-M#A      ;; Carriage-return/line-feed
0252      REL       ;; Length of message
0253      MEND      ;; Switch back to program

0142'     0255      DEPART    1,'Incompatible version of CDOS'
014D'     0266      DEPART    2,'Will not operate under CROMIX'
0158'     0277      DEPART    3,'There is no "="
0163'     0288      DEPART    4,'Strings to left of "=" is null'
016E'     0299      DEPART    5,'No program name to link to'
0179'     0310      DEPART    6,'Program not found'
0184'     0321      DEPART    7,'Compare is unequal'
018F'     0332      DEPART    8,'Malformed command line'
019A' (0056') 0343
019A' (0056') 0344      END    START

Errors      0
Range Count 0

Program Length 019A (410)
Data Length   00CB (200)
```

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About the Author:

Peter Zilahy Ingerman is a systems consultant with in excess of 20 years of experience in computing and programming. In conversations and correspondence we have found his observations and comments to be brilliant, witty and urbane. His software offerings seem to follow the same path. Ingerman can be contacted in Willingboro, New Jersey at (609) 871-7474.

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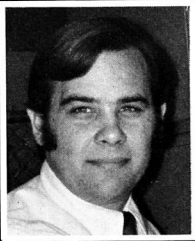
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non-standard configurations. TEC TIPS is edited by Richard Quinn, owner of QUINTEC, a Southern California Computer service firm.

Interfacing Serial Printers to a TUART Under CROMIX

Even though the TUART does not support any kind of extensive handshaking for serial printers, some of the features built into CROMIX drivers offer considerable flexibility when setting up serial printers. We have interfaced the Teletype model 40 to several systems. Teletype has a modified serial interface in which the baud rate is adjustable from 110 to 9600 and with a small character buffer. When the character buffer of the printer is full, usually when one line of text has been received, the printer brings low a control line similar to "BUSY" in the Centronics interface. This line is supposed to signal the host computer to cease transmission while the printer prints the line. There is usually a pause after each carriage return because bi-directional printers, which include most high-speed dot matrix and letter quality printers, must receive an entire line before they begin to print. Otherwise the printer will not know where to begin printing on the right-to-left or left-to-right line.

In the past, I have run the baud rates very low simply to keep from overflowing the printer's buffer during the printing of a line. The problem with this is that it slows down the overall speed of the printer. Because the TUART does not support any serial handshaking in a hardware sense, there had been no other solution. However, in the new versions of CROMIX (11.05 or newer—current version is 11.11 or 20.09 for 68000 systems) there is a carriage return delay code. If you type MODE followed by the device name you will see the value given to the delay code. If the value is "0" as is standard for these drivers there will be no delay upon carriage return.

You can follow the CROMIX manual to increase this delay from a short time to a fairly long time getting the same effect as a hardware handshake. We are currently running our Teletype chain printer at 2400 baud with no hardware handshaking simply by using this powerful feature in the CROMIX drivers. You can experiment some with the delay codes to determine the optimum speed for your printer and baud rate.

Modems with CROMIX

Many people have found it advantageous setting up their system using a modem for communications from remote locations. There is no special software or driver needed. Simply hook the modem to an unused TUART or Quadart/IOP port and the system will work like a champ. No special communication software is needed. Simply set the baud rate in the TTY table for the desired speed of your modem. Then when calling the system from a remote location with an auto-answer modem simply hit carriage return two or three times until you receive a clear login on the remote terminal. After that use your password (we recommend password protection as others will be able to dial up your system) and you're on.

Most modems will work with no special handshaking. Some however require the data set ready line to be pulled high for proper operation. There is a 12-volt source (see schematic for TUART or Quadart/IOP) that simply stays high. This line can be tied from the computer to the modem to hold the modem in an 'on' condition.

More sophisticated modems with handshaking can be used via the Quadart. There are drivers in the current versions of CROMIX to support a number of modems with different features. However, you must have

the Quadart/IOP set-up to achieve this hardware handshaking.

A last caution regarding modems: Be certain when you buy a modem, especially of the 1200 baud type, that you specify a full-duplex, two wire modem. Some modems are only full duplex if used with a four wire system. These require dedicated phone lines and are not generally as easy to install or as universal as the newer full-duplex two wire systems. In addition, should you purchase the four wire system you will be unable to use it in an auto-answer, auto-dial up configuration.

CPU Selection on the WDI-II

The WDI-II, which is the universal replacement for the earlier Winchester drive interface card, WDI, must be properly set for use with the ZPU, SCC, or DPU. As shipped from the factory the WDI is set for use with the normal ZPU or Z-80 systems. In order to use it with the single card computer or the dual processor card you must make a minor jumper modification to the card. Systems shipped from the factory with the SCC or DPU cards as standard equipment have been modified and tested at the factory. This modification would only apply to systems that were being retrofitted especially with the DPU.

For use with the ZPU, the most common configuration and factory standard configuration, the small jumper pads above IC 6 labeled "A" and "B" should be jumpered as follows. Solder a small piece of wire from the centerhole on pad A to number 2 on pad A. On pad B, solder a small wire from the centerhole of pad B to point 4 on pad B.

For use with the single card computer, pad A is jumpered the same as with a ZPU, but pad B should be jumpered from the centerhole of pad B to point 3.

For use with the dual processor card, jumper the centerhole of pad A to number 1 and the centerhole of pad B to number 4. This will select the WDI-II for use with the proper CPU. Note that on WDI-II revision B1

tec-tips

there is a legend error on pad A in conflict with the previously given instructions. Ignore the silk-screened legend on the card as it is incorrect.

PRI Modification in CROMIX Systems

I continue to see a large number of systems that have both PRIs and TUARTs addressed at port 50. While the majority of the systems I have seen are working, some suffer from occasional lockup. When using a system with a Centronics interface printer it is not necessary to use a PRI if there is a TUART in the system as well. The PRI should be used only in systems that have no TUART or are driving Cromemco's full letter quality daisy-wheel printer, the 3355, the 3355A or the 3355B. If you have a TUART and a PRI in the system and you need the PRI to drive the daisy-wheel printer, the parallel port on the PRI should be disabled and the B parallel port on the TUART used to drive the Centronics printer. To disable this port remove IC 14 from its socket and bend pin number one up so that when the chip is replaced in its socket the pin no longer makes connection. This will leave the TUART port B with Base address 50 and the port 50 port on the PRI disabled.

New C-10

We have just received our first C-10. We had seen them for several months at various computer shows but this is the first one we have had "hands on" experience with. With me, hands-on means a screwdriver and an hour when nobody bothers me.

I was impressed to learn that the new C-10 has a switching power supply. To the best of my knowledge this is the first product Cromemco has manufactured with a switching power supply. That is an extra feature that I hadn't realized was there.

In addition it is nice to learn that the plug used on the back of the system for the 5" floppy disk is "stackable". By that I mean that there are no special adaptors or extra cables needed as you add disk

drives. That is nice. That means one cable will serve all drives.

I was also surprised to find that the C-10 will support a wide variety of printers. There is an easy set-up for using serial or parallel printers. It is even easier to configure than previous Cromemco systems. In addition to all of these features we have found the screen to be easier to use and clearer than Cromemco's previous terminals. We think that it is going to be a popular computer and the single card electronics, which slides easily out the back for repair or replacement should be a breeze to service. I am looking forward to working more with this system.

Dead Persci 299 Drives

If you have a PerSci 299 drive (double-sided) in a System Three that seems to have gone dead, try booting the system using a single-sided disk. A single-sided disk and a double-sided disk use different index holes. Often the small incandescent bulb that is in the fixture between the A and B side of the drive burns out causing the drive to lose the abili-

ty to operate as a double-sided or single-sided drive depending on which lamp burns out.

If the drive works either single-sided or double-sided but not the opposite then examine the index lamps which are clearly visible in the center front of the drive if you open the front of your System Three. If one light or the other is not burning then it is a simple matter to remove the lamp assembly and replace the small "grain of wheat" bulb. Grain of wheat bulbs are usually available at local Radio Shack stores or electronic supply houses.

Hard Disk Initialization

If you have a hard disk system with either CDOS 2.52 or 2.53 and have encountered hard disk errors with some of your software, it could be because port E1H is not being properly initialized. Symptoms include: 1) Home errors on 5-megabyte systems with DPU's, and 2) Seek errors on last 1/3 of 11-megabyte disks.

Initializing port E1H to 00 should cure these problems. Cromemco says that CDOS 2.54 has corrected this.

GD

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Info & Idea Swapping

One of the principals in a small company located in Sunnyvale, California, is interested in trading information, ideas and experiences with another user in his area who has a similarly configured system. The equipment is a System 3A with IOP/-Quadart, running under CROMIX. Peripherals include two 3102 terminals, a Dataproducts D-50 Daisy Wheel KSR printer, a Dataproducts M-200 340cps dot/matrix printer, two Ventel 212-plus modems, and one 5¼" floppy. He has had a few problems and would like to get together with other users. Interested? Contact Jim Leech at Refsys Corporation, 1021 South Wolfe Road, Suite 245, Sunnyvale, CA 94086. Phone (408) 730-0797.

Assistance Requested

Kevin McHugh in New York has a requirement to emulate an IBM 3741 workstation and interpret the printer control characters that are intermixed with report output. The answer could be found with someone who has experimented with RBTE, or someone who has written their own program. If you can help him, please call Kevin, or his associate John Ruffo, at (212) 986-7520.

February MUG Meeting

The February meeting of the Microcomputer Users Group serving the South Jersey/Philadelphia area will feature demonstrations and comparisons of the Cromemco C-10, IBM-PC, and the Apple IIe. The meeting is scheduled for 7:30 p.m. at King Zog's Tavern, Ferry Avenue Station, Camden, New Jersey.

Modem Software for C-10

Several members are looking for a good modem software package for their brand new C-10s. If you have developed one, or have used a good package, please let us know. We will publish your solicited testimonials next issue.

NWACU Reactivated

The Northwest Association of Cromemco Users, dormant since last summer, has been reactivated by two of its founders, Jim Illman, and Dale Schultz, former manager of the Seattle branch of The Systems

Stores.

When UCI elected to close all its Systems Stores, Schultz and Illman formed Interdiscipline, Inc., to fill the void created by UCI's departure from Northwest Washington. The new company, a systems shop and full-service Cromemco dealership located at 403 S. Brandon in Seattle, will play host to NWACU meetings until such time as membership once again becomes too large for the premises. All those interested in participating in what could become a very active group are invited to contact Illman or Schultz at Interdiscipline. Their phone number is (206) 763-2099.

New Book on 32K Structured BASIC

Wayne Watson of Mountain View, California, is about to publish a book on 32K. The book will contain 14 chapters covering all parts of the language except KSAM, and is liberally peppered with examples. As Watson puts it, "32K Structured BASIC is one of the better implemented languages, and it deserves to have more information known and written about it than is currently available. My book, entitled **An Introduction to Cromemco 32K Structured BASIC**, explains to both the beginner and the advanced user the features and capabilities of the language. It is written in such a way as to overcome many of the mysteries of 32K, and get users quickly started on their way to a better understanding of the language."

Topics include such items as writing large programs, using files, debugging programs, and using procedures. A summary of the concepts, commands, and statements covered is presented at the end of each chapter, and a complete index is included.

The book, which will be available in early March, will sell for approximately \$20.

For further information, contact Watson at:

The Software Hill
1857 Apple Tree Lane
Mountain View, CA 94040
Phone: (415) 969-4233

CDOS Patches Needed

Colin Campbell of Soup's Electron-

ics in Fairbanks, Alaska is looking for a way to patch CDOS or CDOSGEN so that the master disk drive is the "C" drive upon boot in a hard disk system. Under his present method, he feels it is a waste to be required to have a batch job to run STAT/M for auto-booting the system.

He also would like to incorporate MYDRIVERS into a permanent version of CDOSGEN, rather than linking them each time with the extended command line.

Anyone who can help Campbell is invited to contact him at:

Soup's Electronics
P.O. Box 81871 College Branch
Fairbanks, AK 99708
Phone: (907) 456-3487

New Users' Group for S.F. Bay Area

It's hard to believe, but the San Francisco Bay Area—a real hotbed of Cromemco users—has been without an active local users' group for quite some time. No more. BACUP (Bay Area Cromemco Users & Programmers) was formed in January by two software developers, Raymond Barglow and Alan Walworth. Each has over two years experience working with a Z-2H and they are interested in getting a mix of seasoned computerists and raw beginners together to provide BACUP with unrivaled group dynamics. Barglow can be contacted at (415) 841-0708. Walworth can be reached at (415) 548-2692.

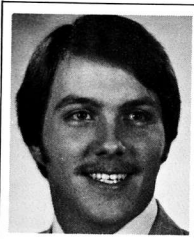
Dazzler Software

Believe it or not, there are still a lot of the original Dazzler boards in service. But, we have had a request from Wayne Beard in Scottsdale, Arizona for software developed for his dazzler. If anyone has such software, would you please let us know about it? We will pass the information on to any and all members looking for same. Thanks.

New Contact at CUGH

The Netherlands Users' Group had a couple of changes since we announced its formation. It is now known as the Cromemco Users' Group Holland—CUGH—and has a new president, Mr. Ben Leonhardt. The secretary and person to contact is Joop Kohler. Kohler's address re-

Continued on page 41



Soft Tips

SOFT TIPS is a regular column aimed at providing software oriented hints and ideas for non-programmers. Members are encouraged to send in tips that can help a user better use his/her system. SOFT TIPS is designed to put forth ideas that are general in nature. The column is edited by Norman Vадnais, Director of Cromemco Activities at Applied Research, Inc. (ARI), a Los Angeles Area dealer. Members contributions can be sent to SOFT TIPS, in care of I/O News.

Soft Tips, under the editorial guide of Norman Vадnais, is a user forum for the sharing of software ideas and advice. The following are printed with thanks to the contributing members.

Repeat/While Loop in 16K

Reading Mr. Zhang Xiao-dong's article (Vol. 2, #6) titled "For-Next Statements in Variable Steps," I realized that the implementation of a Repeat/While loop can be made in a simpler way in 16K BASIC using a boolean expression:

```
10 REM Implementation of Repeat/While loop
20 REM using the For/Next statement
30 FOR I=0 TO 1
40 PRINT "4 + 5 = ?";
50 INPUT " ",X
60 I=(X=9) : REM this is a boolean expression
70 NEXT I
80 PRINT "You're right!"
90 END
```

Doing so there are three statements less. If the value (X=9) is TRUE, then it is equal to 1 and the control is transferred to statement 80. If the value (X=9) is FALSE, then it is equal to 0 and the loop is re-executed.

Notice that in most BASIC interpreters the value TRUE is corresponding to -1, so statement 60 is to be modified as follows:

```
60 I = -(X=9)
```

Sincerely,
Massimo Percotto
Member #01863
Sigma Systems srl
38, Via Valussi
33100 Udine, Italy

Organizing Files in a CROMIX Directory

One of the problems I encountered in working with CROMIX was always having to have the pathnames for disk drives located in the root directory.

In developing programs for SBASIC, I would eventually have to specify disk drive designations and then test them. If I had more than one client, several of my files would become intermingled in the /b or /c directory. If the files had the same name—LOOK OUT!

The solution was to allow each user to have a set of disk drives in his very own directory.

The CDOS simulator, sim.bin, has a stable of pathnames starting at hex location 10DD (under debug). Starting at that location, the table appears as follows:

```
10DD 2F 62 2F 00 2F 63 2F 00 2F 64 2F 00 2F 65 2F 00
      /b/.c/.d/.e/.
10ED 2F 66 00 2F 67 2F 00 2F 68 2F 00 00 00 00 00
      /f/.g/.h/.....
```

The /b/ is the pathname for drive B; /c½ is for drive C, etc. By changing these pathnames to ^b/, ^c/, etc., or b/, c/, etc., each user will be able to have his own set of disk drives.

Which format you use is up to you. In the ^/b version, your main SBASIC program would reside in /usr/john/-main.program and your disk drives would be in /usr/-john/b, /usr/john/c, etc. In the b/ version, your main SBASIC program would reside in /usr/john, while your drives would be in /usr/john/b, /usr/john/c, etc. If John were somewhat prolific in writing programs, he would probably carry his programs a bit deeper (i.e. /usr/john/program.type.one/main.program) and have a set of disk drives for each set of programs he will write.

To make the changes to allow this, you will be altering a .bin file and therefore will have to be a privileged user. You will also need to have debug.com. (If you don't have debug.com, your dealer can probably make the changes indicated below in about five minutes).

Here are the steps:

Login as a privileged user

```
d /bin
copy sim.bin sim.old
debug sim.bin
  Debug version xx.xx
  Next = 1780
  NextM = 1780
- DM 10DD
```

```
10DD 2F 62 2F 00 2F 63 2F 00 2F 64 2F 00 2F 65 2F 00
      /b/.c/.d/.e/.
10ED 2F 66 2F 00 2F 67 2F 00 2F 68 2F 00 00 00 00 00
      /f/.g/.h/.....
10FD 00 00 00 00 00 00 00 00 FF FF FF 00 00 00 00
      .....
110D 00 00 00 00 00 00 00 00 00 00 00 00 00 00
      .....
111D 00 00 00 00 00 00 00 00 00 00 00 00 00 00
      .....
112D 00 00 00 00 00 00 00 00 00 00 00 00 00 00
      .....
113D 00 00 00 00 00 00 00 00 00 00 00 00 00 00
      .....
114D 00 00 00 00 00 00 00 00 00 00 00 00 00 00
      .....
```

- SM 10DD

```
10DD 2F 5E 62 2F 00 5E 63 2F 00 5E 64 2F 00 5E 65 2F 00
10ED 2F 5E 66 2F 00 5E 67 2F 00 5E 68 2F 00 00 00 00 00
10FD 00 .
```

- DM 10DD

```
10DD 5E 62 2F 00 5E 63 2F 00 5E 64 2F 00 5E 65 2F 00
      ^b/.^c/.^d/.^e/.
10ED 5E 66 2F 00 5E 67 2F 00 5E 68 2F 00 00 00 00 00
      ^f/.^g/.^h/.....
10FD 00 00 00 00 00 00 00 00 FF FF FF 00 00 00 00
      .....
110D 00 00 00 00 00 00 00 00 00 00 00 00 00 00
      .....
111D 00 00 00 00 00 00 00 00 00 00 00 00 00 00
      .....
112D 00 00 00 00 00 00 00 00 00 00 00 00 00 00
      .....
```

Continued on next page

32 K Classroom

32K Classroom is a regular column aimed at explaining some programming techniques using 32K Structured BASIC. The main emphasis is on "how to" with secondary emphasis on coding effectiveness. 32K Classroom is edited by Michael Turnage, President of Turnage & Turnage, Ltd., a software development company in Sunnymead, California.

A Single Letter Selection Program

When running some commercial software I have noticed an interesting feature which is used in many menu driven packages. You are requested to make a single letter selection. The moment you depress the key for your selection the computer takes control without requiring you to depress the return key. This feature can be implemented in SBASIC through the use of a little known statement of GET\O\A\$. The statement causes SBASIC to capture the first key stroke and place it into the string variable selected. This is

done through the computer port 0 which is the receive port for the terminal. This feature has been used with other terminals besides Cromemco's and requires no modifications. This feature should be used with care because if improperly used the statement can trap you into an endless loop which can only be exited through resetting the computer. The statement intercepts the first keystroke and you must develop an interrogation code to redirect the program.

The following listing is a menu using the GET\O\A\$ statement.

```
LIST
10  Rem PGDUMP.BAS
20  Rem TEST PROGRAM TO DEMONSTRATE READ CURSOR
    FEATURE OF 3102
30  Rem NORMAN MILLER 11/81
40  Rem PAINFULLY SLOW BUT IT WORKS !!!!!!!!!!!!!!!
50  Rem
60  Dim A$(0)
70  Dim Line$(80)
80  Dim OldIn$(80)
90  Rem OPEN THE NECESSARY DRIVERS
100 Open\1\""$LP"
110 Open\2\""$CO"
120 Rem DOUBLY NESTED FOR-NEXT LOOP MOVES CURSOR ACROSS
    ENTIRE
130 Rem SCREEN READING CHARACTER AT EACH CURSOR POSITION
    INTO A$
140 Rem AND CATENATING IT ONTO LINE$.
150 Rem TEXT IS SENT TO PRINTER AFTER EACH LINE IS READ,
    THEN LINE
160 Rem BUFFERS LINE$ AND OLDLN$ ARE CLEARED OUT.
170   For Y = 1 To 24
180     For X = 1 To 80
190       Put\2,X,Y\
200       Put\0Chr$(27);"G"
210       Get\O\AS
220       Line$ = OldIn$ + A$
230       OldIn$ = Line$
240     Next X
250   Print\1\Line$
260   Line$ = ""
270   OldIn$ = ""
280 Next Y
290 Close\1\
300 Close\2\
310 End
```

A Short Program for Printing a CRT Display

There might be times when you would like to transfer information on a microcomputer screen directly to the printer as printed on the screen. This can require many additional lines of code; and while the task can be handled in several different ways, only one method will be discussed here. Several users have had the need to transfer information to the printer from the CRT terminal, and the following was suggested to a user who called Cromemco. Cromemco's solution to the task is painfully slow, per their own comments, but it does work. The program can be improved and should be rewritten for increased speed. If you do rewrite this program, please forward a copy to me via I/O News. The following is offered with personal thanks to John Willner for contacting Cromemco, and to Norman Miller for providing the solution.

This listing is designed to function on the Cromemco 3102 terminal only using the read cursor feature.

CD

Continued from page 33 Soft Tips

```
113D  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
114D  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
.....
- W
- CNTRL - C
#
```

And it's ready for use!! If you have any questions, you can contact me at the following address.

Sincerely,
Robert Brown, Jr.
Member #01429
1327 Louisiana
Vallejo, CA 94590

(Norman Vadnais' Comment: Members, this scheme works for all CDOS-CP/M software, including general accounting systems [which always seem to need more directories!]. Thank you for the input.)

CD

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Continued on next page

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M. Nadaire, (MSEE) Mgr. Paris Office

Major Market Area:

Sales: San Francisco Peninsula extending internationally.
Service: S.F. Peninsula extending into N. California
Paris Office: 4 Rue Paul Bert
92150 Suresnes, France
Tel (1) 506 33 03 TLX 610994F

Mid United States

COMPUTER CENTERS OF AMERICA
2200 Southwest Fwy. 2629 Stemmons Fw.,
Houston, TX 77098 Dallas, TX 75207
(713) 527-8008 (214) 638-4477

Complete line of hardware and software. Repair on warranty service. Distribution and OEM division. In-house software house with products in system and applications software. Special export department to service foreign dealers.

Key Personnel: Avery More, President (Sales)
Lee Dixon, Dallas Manager
Race Feirman, Houston Manager
Moti Tenenhouse, Technical Director

Major Market Area: Texas, Southwest, Mexico, Middle East

JEPSAN GROUP K, INCORPORATED
4778 Broadmoor, S.E.
Grand Rapids, MI 49508
(616) 698-8700

Jepsan Group K is an exclusive Cromemco dealer located in a professional office environment with two demo rooms and four Cromemco Systems for use by customers. Extensive service facilities for all Cromemco hardware, including expertise in PerSci drive and IMI disk repairs. Software consultation and customizing, with specialties in accounting and business applications. Developers of *File Management*.

Key Personnel: Phil Schneider, Pres.
John Nordine, Vice Pres.
Elaine Light, Sales Coordinator
David R. Prus, Computer Systems Engineer

Major Market Area: Sales and Service: Western Michigan
Extended Market Area: Service and Software: U.S. and Canada

COMPUTER SALES, INC.
1700 N. Main Street
Racine, Wisconsin 53402
(414) 634-5558

Full-service computer center with retail showroom, service department and extensive training program as well as in-house software development. Carries full line of Cromemco hardware, software, accessories and literature. Custom programming for professionals, retail and manufacturing. Key personnel have strong background in systems analysis and consultation with emphasis on construction, accounting and business applications.

Key Personnel: Fred Cape, President
Ted Witzig, Vice President
Bill Aronin
Fritz Cape

Major Market Area:
Sales & Service: Southeastern Wisconsin
Specialized Systems: Continental United States

TRADEWIND SYSTEMS
Box 96, West Highway 54
Liberal, KS 67901
(316) 624-8111, IN KS 1-800-362-9000

Continued on next page

Exclusive Cromemco dealer, specializing in complete business systems. Provides consulting services. Full inventory.

Key Personnel: David Fuller, Store Manager
Ray Cole, System Development
Kevin Elmore, System Development
Randy Hope, Sales
Clark D. Stewart, President
Wayne Stewart, Vice President

Major Market Area: Sales: S.W. Kansas, extending to Colorado, Kansas, Oklahoma, Texas, New Mexico.
Service: S.W. Kansas

SYNERGISTICS INTERNATIONAL LTD.
35 Fountain Square Plaza, Suite 207
Elgin, IL 60120
(312) 695-7775

Full inventory of Cromemco hardware and software. Custom software developed in-house. Vertical market packages available include: Chiropractic Clinics; Architectural Woodwork Job Costing; Social Service Agency Accounting; Auctioneering. Specializing in providing turnkey systems to small and medium sized businesses.

Key Personnel: Jim Knowles, Pres. (Sales)
Gordon Muirhead, Vice Pres. (Software)

Major Market Area: Sales: Chicago and suburbs, extending to entire U.S. and the U.K. Service: Chicago and suburbs.

Eastern United States

ALTERNATIVE SOFTWARE
1165 Barbara Drive
Cherry Hill, NJ 08003
(609) 429-3838

Medium-sized software house, specializing in small business systems; all models of Cromemco/payroll, billing, mass mailer. Provides warranty service also contract and hourly service.

Key Personnel: Jim Lenz, Pres. (Software design & development)
Deborah Lenz, Vice Pres.
Ken Peacock, Service Mgr.

Major Market Area:
Sales: New York to Washington, extending to entire U.S.
Service: Metro Philadelphia extending to Eastern Corridor.

COMPUTER SYSTEM & TECHNOLOGY, INC.
21-55 44th Road
Long Island City, NY 11101
(212) 937-2900/Telex: 910-429418 CSTNY

Involved in computer business since 1979. Key personnel have strong background in engineering, software development, financial markets and import/export trade. Provides consultation and custom-made programs for governments, manufacturers, wholesalers, retailers and professionals.

Key Personnel: Mr. Mike Fung, Vice President
Ms. Fanny Ho, Manager
Ms. Salina Ho, Systems Analyst

Major Market Area: New York, China, Hong Kong and Iceland
CCS, INC.
A Computer Services Company
122 East 42nd Street

(212) 986-7520

Large Cromemco OEM specializing in custom applications on Cromemco Hardware. Full range of services including hardware sales, rentals, long and short term leasing, custom programming and continuous hardware and software support. Specialists in database and large scale financial applications.

Key Personnel: Richard Levey, Vice President
John Ruffo, Vice President

Major Market Area: U.S. and Major cities throughout the world.

COMPUTER CLOSET INC.
20 Old Turnpike Road
Nanuet, NY 10954
(914) 624-8808

Complete systems house providing sales, service and support for the full line of Cromemco hardware and software. Provides system planning and design for custom applications in business, education, and professional fields. Regular schedule of seminars and training classes offered.

Key Personnel: Rick Townsend, President

Major Market Area: Sales: Northeast U.S. and East Coast
Service: Continental U.S.

COMPUTER SERVICES FOR SMALL BUSINESS
42 West Ivy Lane
Englewood, NJ 07631
(201) 568-7602

CSSB is a small service bureau and software house using Cromemco hardware combined with proprietary custom software. Software applications packages include PAYROLL, ACCOUNTS RECEIVABLE, SALES ORDER ENTRY WITH INTEGRATED INVENTORY, GENERAL LEDGER, and MAILING LISTS. Packages are expandable, but current average user has 200 active employees, 1500 customer accounts, 6000 open invoices, & 7500-part inventories. CSSB installs and maintains Cromemco systems as an OEM. Other services include custom business programming, consulting, and on-site training.

Key Personnel: Coley Brown, President

Primary Market Area: Hardware Sales & Service — New Jersey & Southern New York State. Software Licensing & Service — U.S., Canada & Mexico.

CUSTOM COMPUTER SPECIALISTS, INC.
208 Roanoke Avenue
Riverhead, NY 11901
(516) 369-2199

Full service systems house with retail showroom. Full line of Cromemco hardware, software, accessories, and literature. Provides warranty service, diagnostics, consultation, systems analysis, and custom programming. Special management software for attorneys, mass transportation scheduling, reservations, delivery manifests, education, small businesses. School rentals, teacher training.

Key Personnel: Gregory G. Galdi, Pres.

Major Market Area: Sales: Northeast U.S., extending to East Coast
Service: East Coast extending to Continental U.S.

COMPUTER CENTER INC.
31 East 31st Street
New York, NY 10016
(212) 889-8130

480 Lexington Avenue
New York, NY 10017
(212) 687-5090

Continued on next page

Complete computer center housing a full line of Cromemco hardware and software. Special services include installation, warranty service, and customer education. Large selection of Cromemco software packages as well as custom programming for business and professional applications.

Key Personnel: Robert Silverman, Pres. (software)
Barry Becker, Vice Pres. (hardware)

Major Market Area: Service — Primarily East Coast.
Sales — Worldwide

METROPOLITAN COMPUTER

**110 Harvard Street
Brookline, MA 02146
(617) 277-5115**

A full service and support dealership committed to a full line of Cromemco products. Service offered on both an hourly basis and by contract, and includes custom-designed hardware and software for individual interfacing needs as well as communications applications. Complete Cromemco line on display and available for hands-on demonstration, including color graphics system.

A wide range of software including all Cromemco software is available. Dealership specializes in word processing, accounting packages and data base systems. A full-time engineering and sales staff is maintained for customer support.

Key Personnel: Frederick S. Lebow, President (Engineer)
Dwight Calhoun, Director of Engineering
Melissa Lavers, Sales Staff
Eugene Cimino, Sales Staff
C. Eugene Jones, Sales Staff
Karen Greenberg, Sales Staff

Primary Marketing Area: Massachusetts
Extended Marketing Area: New England States

**ROYAL DATA, INC.
2199 Garden Street
Titusville, FL 32780
(305) 267-1960 269-3116**

A full-service computer sales and support organization. More than 22 years comprehensive applications experience in process control, telecommunications and office automation. Complete Cromemco line in stock, including Graphics systems.

Featuring manufacturing inventory control, Bill of Materials, Accounting Plus software, Lear Data Tristar dental and general business software. Custom development for real-time data acquisition and control. Emulator support of virtually all CP/M software under CDOS and CROMIX.

Key Personnel: Jency Kelly, Pres. (sales & marketing)
Mark Clough, Sales Engineer
Bill Hardin, Repair and Maintenance
Charles Brossier, II, Technical Software Support
Jean C. Kelly, Office Manager

Major Market Area: Southeast Florida

Mexico

**SOPORTE ADMINISTRATIVO COMPUTACIONAL, S.A.
15 De Mayo #1111 PTE
Monterey, N.L. Mexico
43-83-40**

Complete line of Cromemco hardware and software in inventory. Specializing in the educational field. Full service facility, providing technical consulting, as well as warranty repair service.

Key Personnel: Juan Angel Perez, Director (systems)
Jaime Martinez, Customer Support (MSEE)
Gerardo Elizondo, Technical Mgr. (MSEE)

Major Market Area: Latin America,
Sales & Service: Internationally, primarily Mexico

**MICROMEX, S.A.
Aldama No. 78
Colonia del Carmen, Coyoacan
Mexico, D.F. 04100
554.75.75, 554.27.42**

Full service company. Complete line of Cromemco equipment with sales agencies in Mexico City, Monterrey, Guadalajara, Tampico, Veracruz, San Luis Potosi, Coatzacoalcos and Torreon. Emphasis on complete computer solutions for small and medium-sized companies. Warranty and regular service available.

Key Personnel: Dr. Enrique Grapa, General Manager
M.C. Angel Kuri, Hardware Director
Ing. Pedro Escarcega, Software Director
C.P. Louis Antonio Sandoval,
Administration Director
Marcos Ortiz, Sales

Major Market Area: Sales & Service: Latin American,
primarily in Mexico and Central America.

South America

**EPROM LTDA.
Antonio Bellet 226, #704
Casilla 16494, Correo 9
Santiago
Chile
740910/Telex: 332-340436 PBVTR KU**

Eprom is a consulting firm which specializes in software development for business applications and process control in industries. Computer marketing of the company is limited to CROMEMCO systems.

Key Personnel: Jorge Bellet, Sr. Executive
Eliana Ferrada, Administrator
Friedmut Ballek, Sr. Engineer

Major Market Area: Most of Chile. Local service is now being offered in Santiago, Valparaiso, Concepcion and Africa.

**PERSOCOM
Peru 103, Piso 8
1067 Buenos Aires
Argentina
30-4498/Telex: 390-17341 ITTEL-A RMMM**

Persocom SA is the holding company of Plus Computers SA. Plus is marketing a full line of CROMEMCO products along with other IBM-compatible products.

Key Personnel: Esteban Gimenez Vives, President,
General Manager
Raul Manuel Avila, Director
of Operations
Roberto Boldrini, Director of
Technical Support

Major Market Area: All of Argentina, with special emphasis
in the Buenos Aires area.

Continued on next page

International England

COMART LIMITED

Little End Road
Eaton Socon
St. Neots, Huntingdon
Cambridgeshire PE19 3JG
UNITED KINGDOM
(0480) 215005/Telex: 851-32514 COMART G

Dynamic UK distributor—20,000 sq. ft. warehouse. Full CROMEMCO range of hardware, software, and peripherals for stock, demo and training. Nationwide network of dealers. Sales, plus full hardware and software support. Warranty service, plus maintenance and service repair at nationwide and local levels. Extensive testing and development facilities.

Key Personnel: David Broad, Managing Director
John R. Lamb, Marketing Director
David Fear, Sales Director
Peter Webster, Product Marketing Mgr.

Major Market Area: Nationwide UK and Eire

Ireland

LENDAC DATA SYSTEMS, LTD.

8 Dawson Street
Dublin 2, Ireland

Suppliers and supporters of the full range of Cromemco Computer Systems and software.

Key Personnel: Don Lehane, Director, BSC (Computer Science)
Danny McNally, Director, BSC (Computer Science)

Major Market Area:
Sales & Service: Throughout Ireland

Europe

AGRO MARKETING

B Adzije 7/1, 41000 Zagreb
Yugoslavia

41 417-662 Telex: 862-21741 YU AM 2G

Large full-service facility, with complete line of Cromemco products and proprietary software. Specializing in software development, interfacing, and special medical computerized equipment.

Key Personnel: T. Raguz, Director (Marketing)
N. Ivancic, Software Manager
B. Krtolica, Customer Support (Hardware)

Major Market Area:
Sales & Service: Internationally, primarily Yugoslavia

C.T.A. COMBITEXT AUTOMATION

Klein Loolaan 23
3972 KB Driebergen
The Netherlands
03438-18888/Telex: 844-40444 CTA NL

A leading company in the Benelux, in the micro computer market. Represents CROMEMCO computers in these countries. CTA specializes in selling to OEM's, large computer users, and self-programming customers. End-users are supplied with application software via CTA software houses.

Key Personnel: P.H.J.M. Haffmans, Managing Director
CTA Int'l
N. Van Den Bosch, Managing Director
CTA Computers
F. Arnolds, General Manager/Software

Major Market Area: The Netherlands

TELEPRINT/COMPUTEC NEDERLAND B.V.

Member of the Vollwood Organization
P.O. Box 95, Prunellalaan 3
5580 AB, Waalre, The Netherlands
Phone: 04904 - 7575z 1/2 5865
Telex: 51673 / 59175

The Vollwood Organization is a holding company with working companies in many European countries. Active in selling business-type applications where Cromemco hardware, with a wide choice of terminals, is provided to OEM's and subdealers. Specializes in hardware maintenance and adaptations in the hard software.

Key Personnel: J.W. Rozema, Managing Director
Th. J. Van Der Meer, Product Manager

Major Market Area: The Netherlands

VOLLWOOD B.V.

Prunellalaan 3
P.O. Box 128
5582 HB, Waalre
The Netherlands
31-04904-5865/Telex: 844-59175

Computec Benelux is a "daughter" of The Vollwood Organization, a holding company with working companies in many European countries. Active in selling business-type applications where CROMEMCO hardware, with a wide choice of terminals, is provided to OEM's and subdealers. Specializes in hardware maintenance and adaptations in the hard software.

Key Personnel: Mr. H. Oosterveer, Purchasing, Vollwood
Mr. M. Scheller, Germany
Mr. J.W. Rozema, The Netherlands

Major Market Area: Germany and the Netherlands

DIALOG COMPUTER SYSTEME GMBH

Frankfurter Allee 1-3
6236 Eschborn 1
West Germany
06196-46060/Telex: 841-415601 TELEP D

CROMEMCO distributor for the BRD, with a large full hardware-service capability. Offers software support to the CROMEMCO software packages. Primarily serves system and software houses.

Key Personnel: Mr. M. Scheller, Managing Director
Mr. W. Krainski, Techn. & software sales support
Mr. W. Moos, Service Manager

Major Market Area: Primarily West Germany

UNICOMP SPA

Via Fratelli Gracchi, 48
20092 Cinisello Balsamo (Milano)
(02) 6121041 (5 linee r.a.) Tlx: 843-340274 UNICMP

Inventories complete line of Cromemco hardware and software in Italy, with a market extending into Greece. A four-year-old distributor firm, Unicomp offers sales and support of the full Cromemco line for business, scientific and industrial applications.

Continued next page

Key Personnel: P. DiCamillo, Managing Director
S. Focardi, Sales Director
F. Montanari, Systems Manager
A. Capocchi, Service Manager

Major Market Areas: Italy, Greece

Mediterranean

COMPUTER APPLICATION COMPANY, LTD.

Mesogion & Arkadias 29

Ampelokipi, Athens 516

779-8868 or 778-7708/Telex: 863-210 333 BERK GR

The exclusive Cromemco distributor in Greece, Computer Application Company, Ltd. specializes in applications relating to the proprietary software it has written for Civil Engineering, Shipping, and Hotel industries.

Key Personnel: Dennis Ioakim
Theocharis Vafiopoulos

Major Market Area: Greece

ALGORITHM LTD.

183 Syggrou Avenue

Athens, Greece

9330551 or 9345858/Telex: 214296 EMVS

Authorized Cromemco dealer which inventories complete line of Cromemco hardware and software. Specializes in applications relating to system development and application software written for civil engineering and shipping, as well as special software packages for data communication and commercial applications.

Key Personnel: Dimitrios Costakis, Managing Director
Dimitrios Pantalatos, Sales Manager
George Natsis, EDP Manager
Kyriakos Regoukos, Systems Manager

Major Market Area: Greece

Middle East

REALTIME ENGINEERING & DATA ANALYSIS

P.O. Box 278

Dhahran Int'l Airport

Dhahran, Saudi Arabia

(966) (3) 8649043/Telex: 928-670480 READAK SJ

P.O. Box 6156

Jeddah

Saudi Arabia

(966) (2) 6531502

Sales and maintenance of computers, peripherals and supplies within the areas of automation, industrial, business and office. Security systems. Strong in developing Arabic systems (hardware and software) and turnkey projects. Large simulators and facsimile.

Key Personnel: A.A. Salamah, Administrative Director
Nasir Jamil, Manager Digital Systems Div.
Ziyad Ismail, Software Design and Development

Major Market Area: Master CROMEMCO distributor for Middle East (Saudi Arabia, Gulf Emirates, Iraq, Syria, Jordan, Lebanon)

Far East

ASAHI GLASS

Electronics Group

Special Products Marketing Div.

1-2 Marunouchi, 2 Chome

Chiyodaku, Tokyo 100

Japan

781-24616/Telex: 24616 ASAGLAS

Complete line of Cromemco hardware and software in inventory. 700 sq. foot training room. Specializing in O.S. modifications. Full service facility, providing technical consulting as well as warranty repair service.

Key Personnel: Shigeo Satoh, General Manager (systems)
Norimasa Hori, Manager (sales)
Shinichi Watanabe, Tech/software

Major Market Area: Japan

COMPUTER SHOP

JL. DR. Wahidin No. 11

Jakarta, Indonesia

62-21-355868

Complete computer center housing a full line of CROMEMCO hardware and software. Special services include installation, warranty service, and customer education. Separate lab and repair facilities specializing in software development for Indonesia.

Key Personnel: Renaldi Z.K., Managing Director
Veny Zano, Service Manager
Anton, Software design & development
U.L. Permadi, System design

Major Market Area: Stores in Jakarta, Bandung, Surabaya, and Medan, Indonesia.

INDONESIAN COMPUTER ENTERPRISES

JL. Juanda No. 87

Bandung, Indonesia

62-22-81995/Telex: 28360 AC BD

Complete computer center housing a full line of CROMEMCO hardware and software. Special services include installation, warranty service, and customer education. Separate lab and repair facilities specializing in software development for Indonesia.

Key Personnel: Renaldi Z.K., Managing Director
Veny Zano, Service Manager
Anton, Software design and development
U.L. Permadi, System design

Major Market Area: Stores in Jakarta, Bandung, Surabaya, and Medan, Indonesia.

NCC INTERNATIONAL

Matsunaga Building 1-6-6

Sotokanda Chiyodaku

Tokyo 101, Japan KKSHIP J

03-255-1984/Telex: 781-2523758

The oldest Japanese microcomputer store of the Byte Shop chain, offering CROMEMCO to Japan since 1977. This company primarily sells CROMEMCO equipment, and provides high technology and comfortable customer service.

Key Personnel: Kiyotake Ikeda
Toshinori Yamamoto
Ryuichi Kawase

Major Market Area: Japan

Continued next page

REC/EMSCO

133 Kadoori Avenue
4th Floor, Grand Court
Kowloon, Hong Kong
3-7159631 780-39721 EMSCO HX

Electronics and computer distributors.

Key Personnel: Peter Chan
Raymond Watt
Robert Chiu

Major Market Area: China and Hong Kong

SYMBOL ENTERPRISE CO., LTD.

8th Fl. Formosa Plastic Bldg.
New Wing, 201-18 Tunghwa North Road
Taipei, Taiwan
Republic of China
02-711-2777/Telex: 785-22559 BAYFLOW

Symbol Enterprise and its associate, Bayflex Computer, are CROMEMCO computer distributors. They provide the sale and maintenance of hardware, as well as software programming, data processing, and computer programming in Chinese.

Key Personnel: Hurdy J.W. Su, Executive Vice President
Ju-Jer Yang, Vice President
Shu-Ching Kuo, Senior Programming Engineer

Major Market Area: Taiwan, Republic of China

CHINA DATA PROCESSING CENTER

6th Fl., Yu Ming Mansion
7 Roosevelt Road, Section 1
Taipei, Taiwan
Republic of China
02-392-2284/Telex: 785-19844 CDPC CHOWE

One of the largest importer/exporters of computer business/industrial control systems in Taiwan. With several years of computer engineering experience, Tien Sheng provides turnkey basis and reputable service.

Key Personnel: Mr. R. Sheu
Mr. C.K. Cheng
Mr. M.S. Hu

Major Market Area: Taiwan, Republic of China

Australia**INFORMATIVE SYSTEMS PTY. LTD.**

337 Moray Street
South Melbourne, Victoria 3205
Australia
84-86 Pacific Highway
St. Leonards, New South Wales 2065
02 439-3788
Garry Vajda, Manager

Full range of Cromemco, retail and wholesale computer store. Provides full sales and service, specializing in education and small business applications.

Key Personnel: Dr. Simon Rosenbaum, Gen. Mgr.
Ian Savicky, Tech Advisor
Norman Rosenbaum, Sales Mgr.
Mark Coulthard, Engineer

Major Market Area: Sales & Service: Throughout Australia

MINICOMP SOFTWARE & EDUCATION PTY. LTD.

378 Forest Road
Hurstville, N.S.W. 2220
Australia
02-570 7233 Telex AA23976

Minicomp supports the complete range of Cromemco Hardware, Software and Literature. Minicomp also has an extensive range of application software supported by their experienced staff of programmers and analysts. A full technical and educational program is supplied to all of Minicomps customers.

Key Personnel: Murray Cleworth, Managing Director
Kim Ballestrin, Software Director
Lyn Lyons, Systems Analyst
Bernard Esner, Sales Manager
Ian Robinson, Technical Support
Robert Scottu, Engineering Software

Major Market Area: National Hardware and Software sales and support.



Continued from page 32

bits & bytes, nibbles & tweaks

mains: P.O. Box 120, 2910 AC Nieuwerkerk a/d IJssel, The Netherlands 01803 - 3300.

Attention DPU Owners!

John deLaubenfels in Nashua, New Hampshire, has a sparkling new System One with DPU, MCU, and MSU 256, CROMIX, and PASCAL. Whereas the system is fine, he finds the documentation not yet up to snuff, and wants to be contacted by other 68000 system owners who have encountered the same frustrations. Perhaps this would lead to compiling user manuals by users with hands-on experience. Contact John at 6J Highpine Avenue, Nashua, NH 03063.

(Note: I/O News would very much like to be kept apprised of your activities.)

CAD/Graphics for 68000

Danny McNally of Lendac Data Systems in Ireland called us just as we were going to press on this issue with an urgent request for CAD software and/or Color Graphics software for 68000-based systems. He suggests that someone may know of packages written in FORTRAN '77 which could be recompiled to run under the DPU. He further notes that, if recompiling is necessary, source codes should be available. If you have knowledge of any such software, please let I/O News know ASAP. We will forward the information to McNally and keep a copy for other members' inquiries.



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has developed an
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DATA (facts, concepts or instructions
converted to usable form)
MEDIA (materials on which data are
or could be recorded)
COMPUTER PROGRAMS (data used
to direct computer equipment)
LOSS OF REVENUE (due to business
interruption as a result of an insured
peril)

**FOR MORE
INFORMATION**

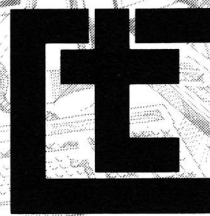
Call William L. Pope, Vice President,
at JOHN BURNHAM & CO.
(714) 833-2462
P.O. Box 2410
Newport Beach, CA 92660

UCSD p- SYSTEM*

version 4 for Cromemco Systems

- User friendly system generation for particular configuration
 - For 5 inch and 8 inch floppies
- Full capacity of 1.2 M bytes on 8 inch and 390 K bytes on 5 inch floppies useable.

Available now from



**Teleprint/Computec
Nederland bv**

Prunellalaan 3, 5582 HB WAALRE, The Netherlands.
Telex 59175 Compu NL/51673 Telep NL. Tel. +31 - 49045865

* UCSD p - System is a trademark of the Regents of the University of California.

Tips

device 1 (the printer). Since we want this process to be repeated over and over again, line 20 is a label and line 70 tells BASIC to go to that label repetitively to form a loop. Line 40 converts the DELETE character to a backspace (making the DELETE key perform the same as the back-arrow key). And line 60 is used to exit the loop when the ESCAPE key is press-

ed (which returns control to BASIC).

Once you have typed in these statements, you can now try out your C-10 in typewriter mode. Simply type "run" beside the BASIC ">>>" prompt and press the RETURN key. Then move your keyboard so it sits in front of your printer, insert the form or paper you wish to type on, and begin typing on the keyboard. You

Continued on page 44

Cromemco Microcomputer-Based Color Graphic System

Outstanding Features

- ☐ No user programming necessary with this turnkey system.
- ☐ Easy full-color image processing for a new dimension in imaginative designs and models.
- ☐ High-speed input/editing of either static or dynamic images with the color video camera input.
- ☐ Combination of the Cromemco microcomputer system with COM System's unique software and hardware configuration.
- ☐ Three different system options to meet individual application needs.

System Functions

- Acquisition, editing, storage, restoration, re-processing and simulation of full-color images.
- Pattern input from either digitizer or color video camera.
- Interactive operation using the command menu on the digitizer.
- Easy image manipulation with more than 60 practical commands.
- Operates under Cromemco Dos.

Typical Applications

Textile design, product design, interior design, exterior design, package design, display design, art education, animation, illustration, etc.

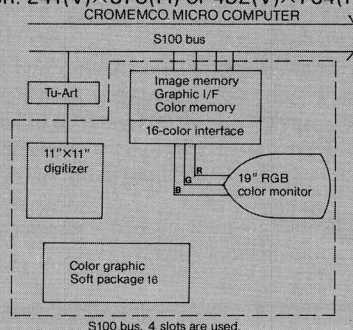
Major Commands

- Straight line, circular interpolation, boundary correction, color change, color insertion, pattern embedding.
- Pattern generation, pattern call, pattern save, overlap pattern display.
- Color painting, picture drawing, snake line, air brush, permeation.
- Panning, zooming, enlargement, reduction, rotation, symmetrical transfer.
- Video input, color division, color pick-up.
- Color pallet ON, color pallet OFF.
- Step and repeat.

System Options and Price List

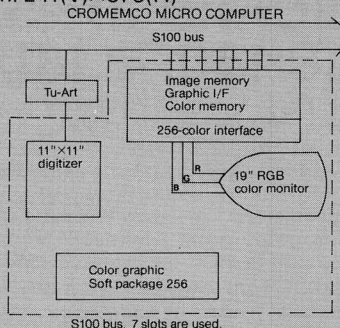
Option I \$17,995.00

Simultaneous display in 16 hues out of 4096-color pallet
Resolution: 241(V)×378(H) or 482(V)×754(H)



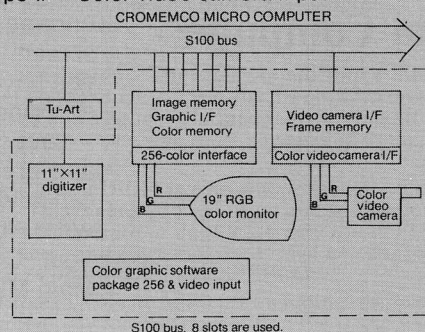
Option II \$31,995.00

Simultaneous display of 256 hues out of 4096-color pallet
Resolution: 241(V)×378(H)



Option III \$53,995.00

The type II + Color video camera input



*The prices are based on FOB Osaka Airport. OEM sales are available.

COMSYSTEM
COMPUTER SYSTEM

COM SYSTEM CO., LTD.

3-3-6, Tosabori, Nishiku, Osaka City 550, Japan
TEL: (06) 445-6057, TLX: 0524-8285 COMSYS J



SoftTec, Inc.

MONTHLY SOFTWARE PLAN

Cromemco users now have a unique new source for software. Once per month, SoftTec sends subscribers a floppy disk loaded with Cromemco-compatible software, including source code, object code, and full documentation. These programs are written in a wide range of languages, including FORTRAN, COBOL, SBASIC, ASSEMBLER, and LISP. The programs are designed to run under the Cromemco CDOS¹ and Cromix² operating systems.

Each of the twelve monthly volumes features a mixture of programs for various applications. Throughout the year some theme editions are also included, such as dBASE II³ applications, 'C' utilities, and Cromix command procedures. An important feature of this service is the inclusion of both source code and executable object code. A user can run the utilities and programs without owning a special compiler, and the program source code is included for all subscribers to see and modify!

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VOLUME ONE, NUMBER ONE - Partial Contents Listing:

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- TC - Utility for counting words, characters, lines
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- TRUNCATE - Truncates the lines in a file
- CAT - Concatenates files, adding optional headings

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Continued from page 11

Using Your C-10 Personal Computer

will find that the down-arrow, back-arrow, TAB, RETURN, and DELETE keys all work as indicated.

In addition, it is possible to select the automatic underline mode of the

Cromemco CLQ printer by pressing CONTROL-Y. Now, everything that is typed will automatically be underlined by the CLQ printer (until CONTROL-Y is pressed again). CONTROL-Y is a toggle which will turn on or off the automatic underline feature. It is also possible to eject a page from the printer once you have finished typing it. This is known as a form-feed and can be performed by pressing CONTROL-L on the keyboard.

You can leave typewriter mode at any time simply by pressing the ESCAPE key. The BASIC prompt will once again be displayed on your C-10 screen. You can save the program you have just created on the disk by entering the command:

save "typewrit"
and pressing the RETURN key. You can now leave BASIC by entering the word "bye" and pressing RETURN. Your C-10 will then redisplay the Main Menu again.

Since you have written and saved on the disk this short program, you can at any time in the future make your C-10 behave like a typewriter simply by entering the command from the Main Menu:

sbasic typewrit
and pressing RETURN. When you do this, however, it will likely be desirable to have your C-10 automatically go back to the Main Menu when you press ESCAPE to leave typewriter mode. This can easily be accomplished by changing one line of our short program.

First, enter the Structured BASIC interpreter mode once again by selecting function number 5 on the Main Menu. Once you have received the BASIC prompt, enter the command:

load "typewrit"

This will load our previously saved program from the disk back into BASIC's operational area. You can type "list" (followed by RETURN) to display the completed program. The line we want to change is line number 110, and we want to change the word "End" to the word "Bye". You do this simply by typing in the new line:

110 Close : Bye

Now give a "list" command just to be sure the change has been made. If it has, then enter the command:

save "typewrit"

once again and then type "bye" to

leave Structured BASIC. Now you can enter typewriter mode at any time simply by giving the command "sbasic typewrit" from the Main Menu and you can leave typewriter mode and automatically go back to the Menu by pressing the ESCAPE key.

You can extend the previous example with the addition of a few more lines of BASIC to behave more like a true electronic typewriter. Try calling up the Structured BASIC interpreter again and typing in the following program in response to the prompt:

```

5 Set 0, - 1 : Noesc
10 Dim Page$(80*66) : Integer
   Page'char
20 Clrscrn$ = Chr$(27) + "E" :
   Undrln$ = Chr$(27) + "d" :
   Normvid$ = Chr$(27) + "d@"
25 Primp$ = Chr$(27) + "p" + Chr$(12) + Chr$(27) + "p"
30 Print Clrscrn$;Undrln$;"C-10
   Electronic Typewriter";
   Normvid$
35 Put\O\Primp$
40 Open\1\"$SLP"
50 *Repeat'page
60 Page'char = 1
70 *Type'character
80 Get\O\Character$(0,0)
90 If Character$(0,0) = Chr$(127)
   Then Character$(0,0) = Chr$(8)
100 Put\O\Character$(0,0) :
   Put\1\Character$(0,0)
110 If Character$(0,0) = Chr$(13)
   Then Put\O\Chr$(10);Primp$
120 If Character$(0,0) = Chr$(4)
   Then Put\1\Page$ :
   Goto Repeat'page
130 Page$(Page'char) =
   Character$(0,0) :
   Page'char = Page'char + 1
140 If Character$(0,0) = Chr$(8)
   Then Page'char = Page'char - 2
150 If Character$(0,0) = Chr$(27)
   Then Goto End'type
160 Goto Type'character
200 *End'type
220 Put\1\Chr$(12) : Close : Bye

```

Before running the program, you should save it on the disk by entering the command:

save "electype"

Now that the program has been saved, you can try it out by entering the command "run" in response to the Structured BASIC prompt, or "sbasic electype" in response to the Menu prompt. The program will

then prompt you to begin typing. Unlike our previous example, electype will display the typed lines on the screen of your C-10 as well as on the printer. This means that you can leave your keyboard positioned in front of the screen and still be able to see what you are typing.

Electype also has a page buffer (called Page\$ above), a string array in which are stored all characters which have been typed. If corrections are made to the typed copy us-

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ing the DELETE or back-arrow keys, these corrections will also be stored in page buffer. The page buffer can be dumped out by pressing CONTROL-D (which stands for "Duplicate"). This means that it is possible to type out a form such as an invoice, correcting mistakes as you go, press CONTROL-L to eject the form from the printer, insert a duplicate form, and press CONTROL-D to print an error-free copy of the original.

CD

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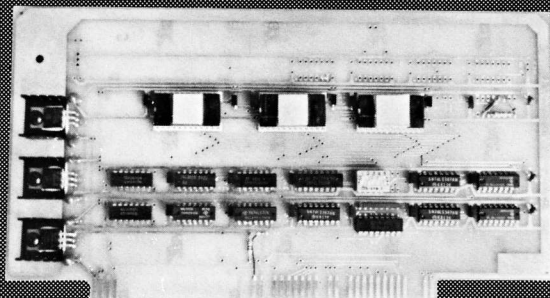
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\$AA	Real	Integer
\$AE	Real	Integer*4
\$AB	Real	Real
\$AQ	Double	Integer
	Exponentiation	
\$E9	Integer*4	Integer
\$EA	Real	Integer
\$EB	Real	Real
	Multiplication	
\$M9	Integer	Integer
\$MY	Integer*4	Integer
\$M1	Integer*4	Integer*4
\$MA	Real	Integer
\$ME	Real	Integer*4
\$MB	Real	Real
	Division	
\$D9	Integer	Integer
\$DY	Integer*4	Integer
\$D1	Integer*4	Integer*4
\$DA	Real	Integer
\$DE	Real	Integer*4
\$DB	Real	Real
	Subtraction	
\$SY	Integer*4	Integer
\$S1	Integer*4	Integer*4
\$SA	Real	Integer
\$SE	Real	Integer*4
\$SB	Real	Real

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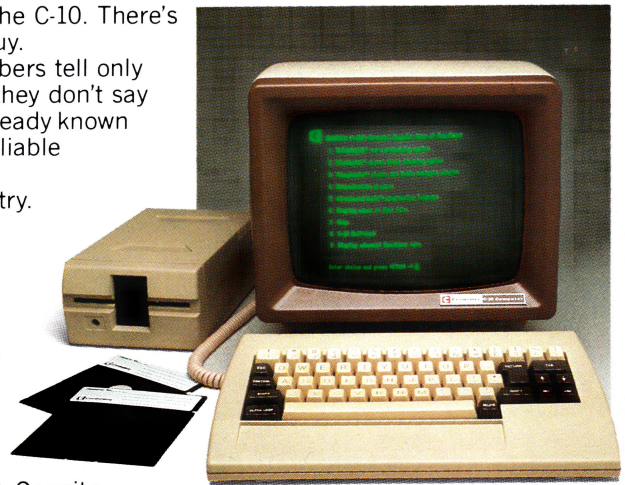
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